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ABSTRACT

This issue contains a regional review, discussion of technical and vocational education in countries of Asia and Oceania, articles dealing with various aspects of technical and vocational education, and a bibliographical supplement. The brief statistical review in section 1 concerns second-level technical and vocational education in the developing countries of Asia and Oceania from 1965 to the mid-1970s. Section 2 deals with second-level, tertiary (postsecondary) level, and on-the-job technical and vocational education by country. Topics include structure, curriculum, programs, institutions, teacher preparation, financing, innovations, and experiments. These countries are included: Afghanistan, Australia, Bangladesh, Burma, China, India, Indonesia, Japan, Nepal, New Zealand, Pakistan, Papua New Guinea, Philippines, Republic of Korea, Singapore, Socialist Republic of Viet Nam, Sri Lanka, Thailand, and Union of Soviet Socialist Republics. Section 3 contains five articles: (1) Educational Attainment of the Work-Force, (2) Effective Use of Learning Resources in Technical and Vocational Education, (3) Practical Spaces of Technical and Vocational Education: An Architectural Design Dilemma, (4) New Perspectives for Technical and Vocational Education in National Economic Development, and (6) Recommendations of the Regional Seminar on Technical and Vocational Education in Asia and Oceania, Singapore, November 1979. Section 4 is an annotated bibliography on technical and vocational education, including programmes linking education and work. (YLB)

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Number 21
June 1980

TECHNICAL AND VOCATIONAL EDUCATION IN ASIA AND OCEANIA

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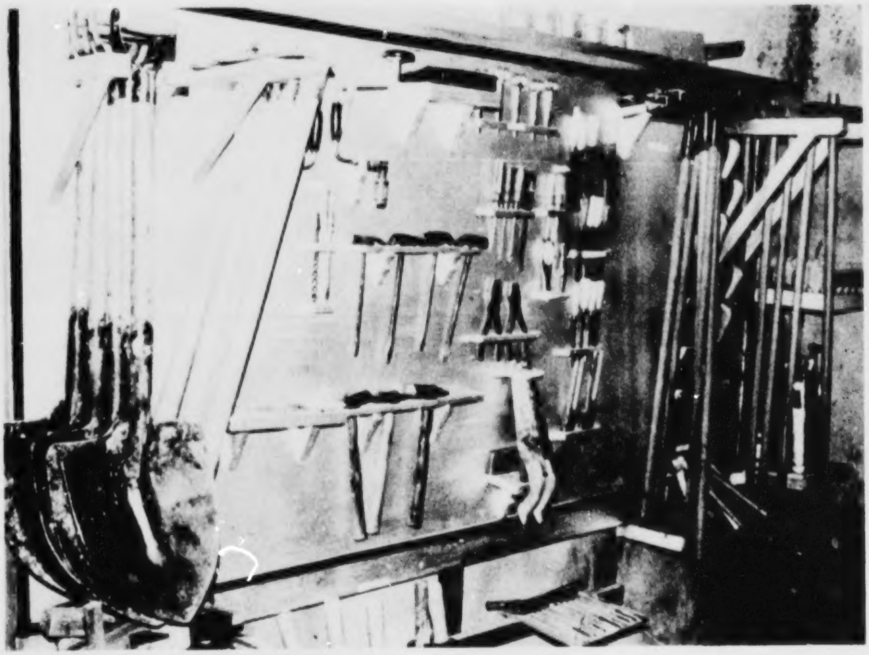
SECTION ONE

TECHNICAL AND VOCATIONAL EDUCATION IN THE REGION OF ASIA AND OCEANIA

I am the carpenter, my tool is the saw
I am the nurse, I heal the wounds
I am the farmer, my tool is the shovel
My job is the best job . . .

Adapted from part of a Tunisian folk song



Bulletin of the Unesco Regional Office
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SECTION ONE

TECHNICAL AND VOCATIONAL EDUCATION IN THE REGION

Introduction

The review presented here as Section One is essentially concerned with second-level technical and vocational education in the developing countries of Asia and Oceania.[1] It does not deal with other important levels and aspects of the technical and vocational education system, such as the training of engineers and technologists at the tertiary level, nor the training of skilled workers on the job. The articles which comprise Section Two do, however, cover these and other aspects of the situation as they apply to each particular country.

The more developed countries of the region are also not covered in Section One, except for the addition of data for this group to the tables which give information by country.[2] This is not to imply that consideration of the status of technical and vocational education in these countries is not called for. Indeed, as their country articles tend to show, they may have problems of complexity emanating from their nearing the 'post-industrial' age that, on the one hand, offer a hint of things to come to their developing neighbours and, on the other hand, could perhaps benefit from a study of the less sophisticated efforts of these same neighbours.

In many developing countries of the region, the 1960s were marked by a rapid introduction of technical and vocational education, often on a 'crash' basis, in an attempt to meet urgent and immediate social and economic needs. This first push in the expansion of technical and vocational education is reflected in the separate country reports.

The following brief statistical review of technical and vocational education at the second level in Asia and Oceania covers the period from 1965 to the middle of the 1970s, in terms of data available. The review also

---

1. The term 'developing countries' both in the discussion and in the tables of Section One refers to the following 18 countries in Asia and Oceania for which data are available: Afghanistan, Bangladesh, Burma, Democratic Kampuchea, India, Indonesia, Iran, Lao People's Democratic Republic, Malaysia, Mongolia, Nepal, Pakistan, Papua New Guinea, Philippines, Republic of Korea, Singapore, Sri Lanka and Thailand.

2. The countries presently grouped under the arbitrary term of 'developed' are Australia, Japan, New Zealand and the Union of Soviet Socialist Republics (USSR).

refers to statistical data on other types of education at the second level: general education and teacher training in general education, with a view to comparing the trends of technical and vocational education to the overall growth of second-level education.

Three countries for which comparative data are not available are not included in the statistical review. These are China, the Democratic People's Republic of Korea and the Socialist Republic of Viet Nam.

Patterns and trends (statistical review)

Enrolments in secondary education by type of training are shown in Table 1.

Table 1. Enrolment at the second level by type of education, developing countries of the region, 1965, 1970 and 1975

(In thousands)

Year	Total	General	Teacher training	Technical/ vocational [1]
1965	26 424	25 030	193	1 201
1970	35 958	33 910	202	1 846
1975	45 433	42 619	267	2 547

Note: 1. The term 'technical/vocational' is here used to cover education of a technical or vocational nature provided in those second-level schools which aim at preparing students directly for a trade or occupation other than teaching.

Source: Fourth Regional Conference of Ministers of Education and Those Responsible for Economic Planning in Asia and Oceania, Colombo, 1978. *Development of education in Asia and Oceania, statistical trends and projections 1965–1985* (ED-78/MINEDASO/REF.2)

The regional data show an increase in technical and vocational education during the years under review, along with the growth of enrolments at the second level as a whole. Based on the data in Table 1, indices of enrolment at the second level by type of education are constructed and shown in Table 2. This table indicates the trend of enrolment at the second level by type of education by taking the enrolment in base year (1965) as 100.

It may be noted that the total enrolment in technical and vocational education in the region had more than doubled by 1975. This figure marks the highest increase in the three types of education at the second level.

Enrolments at the second level by type of education and by country for the period under review are shown in Table 3. Based on these data indices for individual countries are constructed and shown in Table 4.

Table 2. Indices of enrolment at the second level by type of education, developing countries of the region, 1965, 1970 and 1975

(Base year 1965 = 100)

Year	Total	General	Teacher training	Technical/ vocational
1965	100	100	100	100
1970	136	135	105	154
1975	172	170	138	212

Source: **Fourth Regional Conference of Ministers of Education and Those Responsible for Economic Planning in Asia and Oceania, Colombo, 1978.** ***Development of education in Asia and Oceania, statistical trends and projections 1965–1985*** **(ED-78/MINEDASO/REF.2)**

It may be seen from Table 4 that in most of the countries, enrolment in technical and vocational education at the second level shows an increasing trend (though erratic) during the period under review. There are of course variations in the rate of increase in individual countries. The growth rate in enrolment is highest in Iran, followed by the Philippines, Papua New Guinea, Nepal and Singapore. Significant increase in enrolment is also visible in the Republic of Korea, Pakistan, Sri Lanka and Indonesia. Moderate increases have been registered in Bangladesh and Burma. The increase in Afghanistan is small and there is an apparent decrease in India.

In interpreting the data, however, changes in educational structures as well as institutions providing a variety of technical and vocational education in different countries need to be taken into account. In the case of India, for example, major portions of the technical and vocational education sub-system have been moved from the second level to the post-second level. Many other countries have moved part of their network of technical and vocational schools upward as well, thus removing their populations from these statistical areas. Hence the second-level data do not fully reflect the increases in enrolment in the total sub-system. The data available at the third level of education are not resolved sufficiently to indicate which portion of the enrolment in technical and vocational education at the third level has been contributed to by the more recently promoted institutions.

* * *

Tables 3 and 4, which give data by country, follow on pages iv and vi, respectively.

Table 3. Enrolment at the second level by type of education and by country, 1965, 1970, 1975 and 1976

Country	Year	Total	General	Teacher Training	Technical/ Vocational
Afghanistan	1965[1]	45 248	33 982	5 716	5 550
	1970	116 174	107 609	3 597	4 968
	1975	180 217	174 724	758	4 735
	1976	194 967	188 705	391	5 871
Bangladesh	1965	953 302	940 371	5 568	7 363
	1969	1 485 315	1 464 715	8 800	11 800
	1975	. . .[2]	2 442 842	. . .	. . .
	1976	2 317 119	2 298 034	7 610	11 475
Burma	1965	424 467	417 527	3 289	3 651
	1970	791 059	780 463	4 498	6 098
	1972	871 880	860 675	4 428	6 777
	1974	. . .	890 137	. . .	. . .
Democratic Kampuchea	1965	83 994	79 034	945	4 015
	1970	86 999	82 700	1 260	3 039
	1971	102 222	95 349	1 279	5 594
India	1965	17 501 036	17 132 945	74 647	293 444
	1970	21 992 212	21 773 019	18 974	200 219
	1976	26 742 730	26 435 894	102 072	204 764
Indonesia	1965	1 453 834	999 485	60 704	393 645
	1970	2 459 875	1 815 645	99 400	544 830
	1975	3 361 308	2 559 980	79 135	722 193
	1976	3 833 129	2 881 499	133 756	817 874
Iran	1965	576 727	556 829	4 738	15 160
	1970	1 056 787	1 012 920	13 288	30 579
	1975	2 183 137	1 988 670	43 958	150 509
	1976	2 356 878	2 109 381	46 025	201 472
Lao People's Democratic Republic	1965	8 681	5 656	1 757	1 268
	1970	15 453	10 026	3 283	2 144
	1972	20 819	14 633	3 913	2 273
Malaysia	1965	393 651	383 518	641	9 492
	1970	606 449	587 902	999	17 548
	1974	853 839	829 064	–[3]	24 775
	1976	. . .	961 288	–	. . .
Mongolia	1965	60 815	51 881	1 930	7 004
	1970	96 543	84 343	1 600	10 600
	1975	184 688	172 134	1 618	10 936
Nepal	1965	64 679	57 440	760	6 479
	1970	. . .	115 614	. . .	. . .
	1975	. . .	241 412	. . .	. . .
	1976	262 748	243 231	2 702	16 815
Pakistan	1965	1 053 164	1 032 479	8 753	11 932
	1970	1 462 644	1 428 194	12 877	21 573
	1975	2 031 799	1 984 689	17 876	29 234
Papua New Guinea	1965	11 483	7 529	1 027	2 927
	1970	25 293	18 713	1 865	4 715

Table 3. Enrolment at the second level by type of education and by country, 1965, 1970, 1975 and 1976 (cont'd)

Country	Year	Total	General	Teacher Training	Technical/ Vocational
Papua New Guinea (cont'd)	1975	40 783	29 762	1 990	9 031
	1976	43 004	31 455	1 974	9 575
Philippines	1965	1 183 307	1 037 990	3 356	141 961
	1970	1 714 875	...	–	...
	1975	2 254 543	1 591 594	–	662 949
Republic of Korea	1965	1 201 207	1 005 436	.	195 771
	1970	1 935 192	1 634 175	.	301 017
	1975	3 176 154	2 674 972	.	501 182
	1976	3 396 576	2 862 881	.	533 695
Singapore	1965	115 139	102 861	.	12 278
	1970	149 143	136 782	.	12 361
	1975	183 364	153 029	.	30 335
	1976	189 743	152 713	.	37 030
Sri Lanka	1965	842 618	835 505	5 036	2 077
	1970	1 016 427	1 005 834	6 294	4 299
	1975[4]	...	1 063 766	8 855	...
	1976[4]	1 088 089	1 076 502	6 809	4 778
Thailand	1965	418 497	316 736	14 149	87 612
	1970	709 965	511 929	28 253	169 783
	1975	1 153 443	958 889	46 244	148 310
	1976	1 259 082	1 049 360	44 156	165 566
Australia	1965	909 046	771 046	.	138 000
	1970	1 136 960	956 210	.	180 750
	1975	1 095 691	1 095 691	.	–
	1976	1 114 250	1 114 250	.	–
Japan	1965	10 653 794	8 809 997	.	1 843 797
	1970	8 719 908	7 093 443	.	1 626 465
	1975	8 843 511	7 338 479	.	1 505 032
	1976	9 393 666	...	...	...
New Zealand	1965	263 707	...	...	...
	1970	303 835	...	...	...
	1975	351 653	...	...	...
	1976	359 564	...	...	...
Union of Soviet Socialist Republics	1965	8 522 195	4 862 920	299 000	3 360 275
	1970	9 151 655	4 763 655	340 100	4 047 900
	1975	10 738 197	6 213 397	395 000	4 129 800
	1976	10 950 800	6 328 000	402 900	4 219 900

Notes: *1.* Figures for 1965 include enrolment in teacher training at the third level.

2. . . . indicates data not available. *3.* . indicates category not applicable.

4. – indicates magnitude of change nil or negligible.

5. Figures for 1975 and 1976 relate to public education only.

Source: *Unesco statistical yearbook, 1976 and 1977* and *Progress of education in the Asian region, second statistical supplement,* Bangkok, Unesco, 1975.

Table 4. Indices of enrolment at the second level by type of education in selected countries, 1965, 1970, 1975 and 1976

(Base year 1965 = 100)

Country	Year	Total	General	Teacher Training	Technical/ Vocational
Afghanistan	1965	100	100	100	100
	1970	257	317	63	90
	1975	398	514	13	85
	1976	431	555	7	106
Bangladesh	1965	100	100	100	100
	1969	156	156	158	160
	1975	...[1]	260	...	...
	1976	243	244	137	156
Burma	1965	100	100	100	100
	1970	186	187	137	167
	1972	205	206	135	186
India	1965	100	100	100	100
	1970	126	127	25	68
	1976	153	154	137	70
Indonesia	1965	100	100	100	100
	1970	169	182	164	138
	1975	231	256	130	183
	1976	264	288	220	208
Iran	1965	100	100	100	100
	1970	183	182	280	202
	1975	379	357	928	993
	1976	409	379	971	1 329
Malaysia	1965	100	100	100	100
	1970	154	153	156	185
	1975	217	216	–[2]	261
	1976	...[1]	251	–	...
Nepal	1965	100	100	100	100
	1970	...	201	...	...
	1975	...	420	...	...
	1976	406	423	356	260
Pakistan	1965	100	100	100	100
	1970	139	138	147	181
	1975	193	192	204	245
Papua New Guinea	1965	100	100	100	100
	1970	220	249	182	161
	1975	355	395	194	309
	1976	375	418	192	327
Philippines	1965	100	100	100	100
	1970	145	...	–	...
	1975	191	153	–	467
Republic of Korea	1965	100	100	.	100
	1970	161	163	.	154
	1975	264	266	.	256
	1976	283	285	.	273

Table 4. Indices of enrolment at the second level by type of education in selected countries, 1965, 1970, 1975 and 1976 (cont'd)

Country	Year	Total	General	Teacher Training	Technical/ Vocational
Singapore	1965	100	100	.	100
	1970	130	133	.	101
	1975	159	149	.	247
	1976	165	148	.	302
Sri Lanka	1965	100	100	100	100
	1970	121	120	125	207
	1975	–	127	176	–
	1976	129	129	135	230
Thailand	1965	100	100	100	100
	1970	170	162	200	194
	1975	276	203	327	169
	1976	301	331	312	189

Note: *1.* . . . indicates data not available. *2.* . indicates category not applicable.
3. – indicates magnitude of change nil or negligible.

The structure of enrolment at the second level by type of education for the developing countries of the region remained stable over the years under review, with general education forming the bulk of the enrolment (kindly refer to Table 5). The share of technical and vocational education has been gradually increasing however, even though, in some countries, institutions that were previously at the second level were moved to the third level.

Table 5. Percentage distribution of enrolment at the second level by type of education, developing countries of the region, 1965, 1970 and 1975

Year	Total	General	Teacher training	Technical/ vocational
1965	100.0	94.7	0.7	4.5
1970	100.0	94.3	0.6	5.1
1975	100.0	93.8	0.6	5.6

Source: Fourth Regional Conference of Ministers of Education and Those Responsible for Economic Planning in Asia and Oceania, Colombo, 1978. *Development of education in Asia and Oceania, statistical trends and projections 1965-1985* (ED-78/MINEDASO/REF.2)

Technical and vocational education would normally take a greater share in the upper rather than in the lower cycle of second-level education. Since data for the extent of pre-vocational orientation are not available, the increase in the lower cycle cannot be accounted for. It is recognized that many countries in the region have introduced diversifications into general education in the lower cycle through recent curriculum reforms.

Substantial growth in second-level general education is a characteristic, with enrolments at least doubling in the period 1965-1975 in most developing countries.

Percentage distribution of enrolment at the second level by type of education for individual countries is given in Table 6. It is worthwhile to note that enrolment in technical and vocational education in relation to total enrolment varies widely from country to country, ranging from a high of 29.4 per cent for the Philippines in 1975 to less than 1 per cent for a few countries such as Bangladesh and Sri Lanka in 1976. Papua New Guinea, Indonesia, Singapore, Republic of Korea and Thailand form a middle group.

Table 6. Percentage distribution of enrolment at the second level by type of education by country 1965, 1970, 1975 and 1976

Country	Year	Total	General	Teacher training	Technical/ vocational
Afghanistan	1965	100.0	75.1	12.6	12.3
	1970	100.0	92.6	3.1	4.3
	1975	100.0	97.0	0.4	2.6
	1976	100.0	96.8	0.2	3.0
Bangladesh	1965	100.0	98.6	0.6	0.8
	1969	100.0	98.6	0.6	0.8
	1976	100.0	99.2	0.3	0.5
Burma	1965	100.0	98.4	0.8	0.9
	1970	100.0	98.7	0.6	0.8
	1972	100.0	98.7	0.5	0.8
Democratic Kampuchea	1965	100.0	94.1	1.1	4.8
	1970	100.0	95.1	1.4	3.5
	1971	100.0	93.3	1.3	5.5
India	1965	100.0	97.9	0.4	1.7
	1970	100.0	99.0	0.1	0.9
	1976	100.0	98.9	0.4	0.8
Indonesia	1965	100.0	68.7	4.2	27.1
	1970	100.0	73.8	4.0	22.1
	1975	100.0	76.2	2.4	21.5
	1976	100.0	75.2	3.5	21.3
Iran	1965	100.0	96.5	0.8	2.6
	1970	100.0	95.8	1.3	2.9
	1975	100.0	91.1	2.0	6.9
	1976	100.0	89.5	2.0	8.5

Table 6. Percentage distribution of enrolment at the second level by type of education by country 1965, 1970, 1975 and 1976 (cont'd)

Country	Year	Total	General	Teacher training	Technical/ vocational
Lao People's Democratic Republic	1965	100.0	65.2	20.2	14.6
	1970	100.0	64.9	21.2	13.9
	1972	100.0	70.3	18.8	10.9
Malaysia	1965	100.0	97.4	0.2	2.4
	1970	100.0	96.9	0.2	2.9
	1974	100.0	97.1	-	2.9
Mongolia	1965	100.0	85.3	3.2	11.5
	1970	100.0	87.4	1.7	11.0
	1975	100.0	93.2	0.9	5.9
Nepal	1965	100.0	88.8	1.2	10.0
	1976	100.0	92.6	1.0	6.4
Pakistan	1965	100.0	98.0	0.8	1.1
	1970	100.0	97.6	0.9	1.5
	1975	100.0	97.7	0.9	1.4
Papua New Guinea	1965	100.0	65.6	8.9	25.5
	1970	100.0	74.0	7.4	18.6
	1975	100.0	73.0	4.9	22.1
	1976	100.0	73.1	4.6	22.3
Philippines	1965	100.0	87.7	0.3	12.0
	1975	100.0	70.6	-	29.4
Republic of Korea	1965	100.0	83.7	.	16.3
	1970	100.0	84.4	.	15.6
	1975	100.0	84.2	.	15.8
	1976	100.0	84.3	.	15.7
Singapore	1965	100.0	89.3	.	10.7
	1970	100.0	91.7	.	8.3
	1975	100.0	83.5	.	16.5
	1976	100.0	80.5	.	19.5
Sri Lanka	1965	100.0	99.2	0.6	0.2
	1970	100.0	99.0	0.6	0.4
	1976	100.0	98.9	0.6	0.4
Thailand	1965	100.0	75.7	3.4	20.9
	1970	100.0	72.1	4.0	23.9
	1975	100.0	83.1	4.0	12.9
	1976	100.0	83.3	3.5	13.1
Australia	1965	100.0	84.8	.	15.2
	1970	100.0	84.1	.	15.9
	1975	100.0	100.0	.	-
	1976	100.0	100.0	.	-
Japan	1965	100.0	82.7	.	17.3
	1970	100.0	81.3	.	18.7
	1975	100.0	83.0	.	17.0

Table 6. Percentage distribution of enrolment at the second level by type of education by country 1965, 1970, 1975 and 1976 (cont'd)

Country	Year	Total	General	Teacher training	Technical/ vocational
New Zealand	1965	100.0	...	–	...
	1970	100.0	...	–	...
	1975	100.0	...	–	...
Union of Soviet Socialist Republics	1965	100.0	57.1	3.5	39.4
	1970	100.0	52.1	3.7	44.2
	1975	100.0	57.9	3.7	38.5
	1976	100.0	57.8	3.7	38.5

Source: *Unesco statistical yearbook, 1976 and 1977* and *Progress of education in the Asian region, second statistical supplement.* Bangkok, Unesco, 1975.

It may be seen from the distribution of enrolment by sex (Table 7) that there has been a steady increase in the percentage of female enrolment in technical and vocational education in the developing countries of the region. A significant proportion of this increase is through the predominantly female enrolment in courses such as home economics, domestic science and commercial and secretarial practice.

Table 7. Distribution of enrolment in technical and vocational education at the second level by sex, developing countries of the region, 1965, 1970 and 1975

(Per cent)

Year	Total	Male	Female
1965	100.0	73.3	26.7
1970	100.0	68.9	31.1
1975	100.0	67.9	32.1

Source: Compiled from data published in *Unesco statistical yearbook 1976 and 1977.*

Second-level education in most countries of the region originated in highly selective and elitist school systems directed towards the preparation of students for higher education through academic programmes. As expanding economic structures began to demand various types of manpower, and as enrolment ratios at the second level increased, an increase in the diversification of this level has become one of the central concerns of many countries. Considering that general education still makes up a major part of second-level education, however, there is no marked evidence between 1965-1975 that this diversification is being pursued by means of setting up separate vocational and technical streams at the second level.

Statistical data on teaching staff at the second level by type of education and for individual countries are shown in Table 8, indicating the generally increasing number in technical and vocational education over the period under review. It is necessary however to recognize problems of comparability arising from lack of distinction between full-time and part-time teachers, and between academic teachers and technical and vocational teachers. In the field of technical and vocational education, part-time teachers with on-the-job practical experience are often employed. On the other hand, some teachers may teach academic as well as technical and vocational subjects.

Table 8. Number of teachers at the second level by type of education by country, 1965, 1970, 1975 and 1976

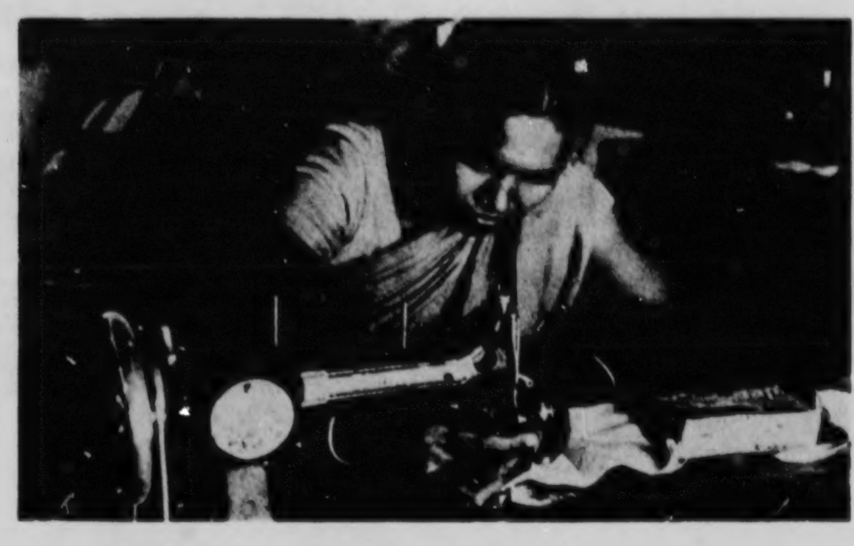
Country	Year	Total	General	Teacher training	Technical/ vocational
Afghanistan	1965	1 942	1 360	329	253
	1970[1]	5 021	4 248	341	432
	1975[1]	8 202	7 425	258	519
	1976	. . .	6 324	. . .	552
Bangladesh	1965	38 006	36 987	328	691
	1969	56 156	54 811	500	845
Burma	1965	10 977	10 546	156	275
	1970	24 636	23 768	307	561
Democratic Kampuchea	1965	3 609	3 196	77	336
	1970	3 937	3 629	28	280
	1972	. . .	2 544	. . .	309
India	1965	767 172	743 982	5 405	17 785
	1970	964 445	948 887	1 534	14 024
Indonesia	1965	68 055	39 560	5 614	22 881
	1970	187 776	130 826	8 170	48 780
	1976	209 511	139 534	8 882	61 095
Iran	1965	20 101	18 598	229	1 274
	1970	30 886	28 244	461	2 181
	1975	81 855	73 056	1 733	7 066
	1976	88 172	84 092	2 262	10 041
Lao People's Democratic Republic	1965[2]	439	200	197	42
	1970	915	436	218	261
	1972	1 104	607	227	270
Malaysia	1965	16 369	15 961	65	343
	1970	23 470	22 842	105	523
	1974	31 159	30 120	-	1 039
Mongolia	1974	7 423	6 511	157	755

Table 8. Number of teachers at the second level by type of education by country, 1965, 1970, 1975 and 1976 (cont'd)

Country	Year	Total	General	Teacher training	Technical/ vocational
Nepal	1965	3 680	3 280	65	335
	1976	11 295	10 609	173	513
Pakistan	1965	54 281	52 845	691	745
	1970	75 722	72 497	922	2 303
	1975	108 524	105 189	808	2 527
Papua New Guinea	1965	. . .	384	. . .	200
	1970	. . .	807	. . .	. . .
	1975	2 017	1 282	166	569
	1976	1 880	1 242	143	495
Philippines	1965	37 809	31 762	. . .	6 047
Republic of Korea	1965	34 360	26 961	.	7 399
	1970	52 232	41 052	.	11 180
	1975	83 811	67 332	.	16 479
	1976	88 230	70 606	.	17 624
Singapore	1965	4 773	4 044	.	729
	1970	7 513	6 358	.	1 155
	1975	7 951	5 812	.	2 139
	1976	7 993	5 879	.	2 114
Sri Lanka	1965	. . .	. . .	449	. . .
	1976	. . .	57 854	. . .	1 239
Thailand	1965[3]	24 810	17 490	1 836	5 484
	1970[3]	44 756	35 641	3 105	6 010
Australia	1965	. . .	41 500	. . .	. . .
	1970	. . .	54 668	. . .	. . .
	1975	74 041	74 041	. . .	. . .
	1976	77 368	77 368	. . .	. . .
Japan	1965	479 510	. . .	. . .	. . .
	1970	477 931	. . .	. . .	. . .
	1975	511 590	. . .	. . .	. . .
	1976	513 190	. . .	. . .	. . .
New Zealand	1965	7 761	. . .	. . .	. . .
	1970	9 932	. . .	. . .	. . .
	1975	12 107	. . .	. . .	. . .
Union of Soviet Socialist Republics	1965	. . .	. . .	. . .	134 034
	1970	. . .	. . .	. . .	182 816
	1975	. . .	. . .	. . .	218 428
	1976	. . .	. . .	. . .	224 000

Note: 1. Figures for 1970 and 1975 include teacher training at the third level.
2. Figures for 1965 refer to public education only.
3. Figures for 1965 and 1970 include teacher training at the third level.

Source: *Unesco statistical yearbook, 1976 and 1977*



Plans and policies

The programmes in technical and vocational education that were initiated over the last decade or two have now been reviewed and evaluated in many countries in the region, especially in terms of the current realities of the economic and employment situations. As a result of these reviews, while queries regarding shortfalls in reaching stated objectives—and indeed even the questioning of the objectives themselves—have been prominent, there is a clearer and more realistic association of the planning of technical and vocational education and national socio-economic planning in most countries. The weaknesses of basic data on manpower requirements have also been highlighted.

Unemployment, particularly among the 18- to 30-year age group, is a serious problem in many countries. Largely modern-sector development has failed to provide employment in sufficient quantities in proportion to the growth of the potential work force. The absorption of a large proportion of the work force in agricultural and agro-based occupations is therefore a plan that has won favour in several developing countries. Data on manpower requirements are now focussing more systematically on this sector of the economy, thus providing new dimensions and priorities for the technical and vocational education system. In several developed countries of the region the shift of emphasis to 'brain-intensive' industry associated with the 'transistor chip revolution' has moved the focus of data on manpower requirements to this area of occupation, again signalling new directions for technical and vocational education in these countries.

Technical and vocational education in the region

The importance given to technical and vocational education has increased markedly in recent years. Most of the national committees that review technical and vocational education have been at the highest decision-making level. Increasing co-ordination by high-level bodies is visible, integrating what were previously scattered programmes. In many countries, these co-ordinating bodies are inter-ministerial in composition. The number of institutions has increased significantly in recent years, as have capital and recurrent expenditure on technical and vocational education.

Enhanced status has been provided to key technical and vocational education institutions, often by promoting them to the tertiary level. This was intended to remove the slur that technical and vocational education was of a lower status compared to other forms of education which had a tradition of leading to higher education. But this has turned out to be a mixed blessing in several countries in the region. The act of promotion has changed the curriculum towards a greater weightage of academic subjects in keeping with the new status. The type of teaching staff has also changed towards more academically-qualified personnel with less practical experience in industry.[3] By promotion, institutions that previously prepared middle-level technical personnel now produce higher-level technologists or engineers who are unsuited for, or unwilling to undertake, middle-level technical and vocational occupations. The appearance in a few countries of junior colleges or regional colleges at the third level of education but which do not necessarily require termination with a full degree certificate is an attempt to meet this apparent dilemma. Another solution attempted is to provide for job-oriented training of middle-level technicians related to specific occupations in separate institutions controlled and executed by Boards for these occupations, such as for integrated rural development and automotive, building, land, transportation, forestry and fishery industries.

Almost all countries in the region have recognized the importance of orienting learners early in regard to technical and vocational education, in particular as a necessary component of general education. Pre-vocational education or vocational preparation at the general secondary level has been given new importance, and in some countries this has been linked to components of socially useful productive work, even reaching down into the first level of education.

Following on this new awareness of the importance of technical and vocational education, and on the criticisms of previous 'crash' programmes, a significant improvement of professionalism is clearly seen in most countries in the region, parallel to similar trends in general education. Professionalism is not equated to being academic or theoretical. It involves using experts of the real work situation as well as experts in content and experts in pedagogy as integrated teams, so that all aspects required for the planning of sound technical and vocational education are considered, and the necessary professionalism brought to bear on the operations. This aspect is particularly prominent in planning in technical and vocational education related to: manpower requirements; curriculum design, development, and evaluation; development of learning materials; and learner and programme evaluation related to national skills standards. In a few countries, the trend towards greater professionalism has been manifested in setting up institutions for such quality improvement activities, so that a permanent core of experts may devote themselves on a continuing and systematic basis to the various operations needed for enhancing and sustaining quality.

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[3] Industry is used in a broad sense to include agriculture, and other appropriate operations and services.

At the implementation level too, a prominent feature is the restructuring of the delivery systems leading to closer co-ordination between technical and vocational education and industrial, agricultural and service agencies within the community, resulting in courses and activities that are flexible, practical and relevant to perceived socio-economic needs. In support of such co-ordination, advisory committees have been set up in several countries at national and sub-national levels. Such infrastructures have provided opportunities for wider participation by consumers of the products of the technical and vocational education system in the planning process. Further, several countries have initiated legal and fiscal measures such as apprenticeship acts and tax benefits, to encourage closer co-operation between the technical and vocational education system and industry.

These actions have been supported by a variety of improvements within the delivery system itself. Theory and practice are being integrated. Short and optional courses are appearing in many institutions. Mass media and non-formal modes are being increasingly used. Community-based multi-purpose institutions are being established, especially in support of rural development. Modular approaches, credit systems, multi-point entry mechanisms, and greater autonomy for institutions to react to local needs, especially of disadvantaged populations, have been initiated in several countries.

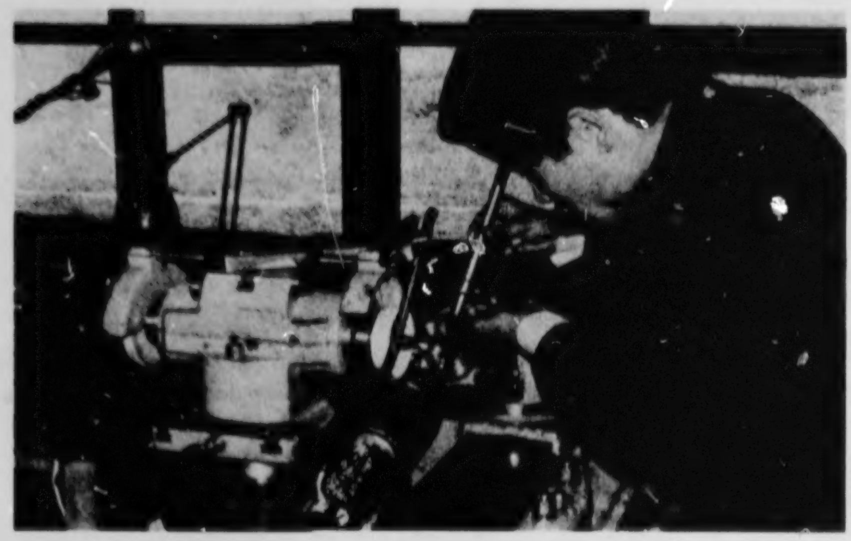
Structure of technical and vocational education

Overall control of the technical and vocational education system varies from country to country. Generally the control of pre-tertiary-level activities is vested in the Ministry of Education, while tertiary-level instruction is under this ministry in some countries and in the ministry responsible for higher education in others. Many countries have constituted policy-making or high-level advisory bodies or councils incorporating personnel from the education ministries, other development ministries, and from private industry. In a few countries, high-level independent councils have been established to advise the Minister of Education regarding policy and implementation matters. Both kinds of bodies have, commonly, terms of reference involving providing advice regarding the integration of activities of the Ministry of Education and other ministries with industry related to technical and vocational education. For purposes of certification in relation to national skills standards, separate Technical Education Boards have been established at the pre-tertiary level in a few countries.

During the 1960s and early 1970s, a simple three-tiered structure for the delivery of technical and vocational education was common in most countries in the region. The first tier, incorporating 'certificate'-level courses for training skilled workers, was of one to two years' duration, and had completion of the first level of education as an entry requirement. The second had 'diploma' courses at technician level and required from one to three years' training and lower-second-level entry requirements. The third resulted in university-level 'degrees' for engineers and technologists requiring from three to five years, and set completion of secondary education as the requirement for entry. These three broad tiers are still visible, but have in most countries been greatly elaborated and extended in the last decade. The changes have mainly sprung from a range of intensive shorter courses now being offered. Some of these are highly specific to particular trades or occupations. Others provide foundations for future options.

Associated with the wider range of courses is the phenomenon of a variety of new institutions for the purpose. These institutions do not necessarily follow the older three-tiered structure and may straddle more than one tier, thus complicating the earlier structuring.

Structures are further elaborated by an increasing use of part-time and distance-learning techniques recently introduced in almost all countries in the region. This expansion in part-time or off-institute study in technical and vocational education is a feature of profound importance in extending the availability of learning and training opportunities, and in meeting immediate occupational demands. The range of availability is also wide, and may be broadly classified into preparatory- or orientation-level courses, trade courses, para-professional courses, and professional courses. It would thus appear that the structures of part-time technical and vocational education are moving towards as large a spectrum of coverage as the full-time structure. Attendance at institutions of part-time learners varies



from 2 to 4 hours a week regularly over one to three years, to intermittent longer block times of attendance, depending upon the nature of the course. These short-time-release or sandwich-type courses have permitted learners to make use of the offerings in technical and vocational education and to enhance their competence without interrupting their current occupations. Part-time education at an institution is also frequently associated with the resurgence of apprentice-type or on-the-job training schemes in technical and vocational education, which in themselves increase the complexity of the profile of delivery structures in these countries.

A further elaboration of the structures stems from the enhanced availability of courses for personnel in service to extend existing skills or as preparation for alternative occupations. These appear as both full-time and part-time courses and do not necessarily fit into the traditional three-tiered structure which provided only for narrowly specified certifications related to a particular tier.

Finally, further elaboration of structures has taken place as courses which were always terminal in the older three-tiered structure are being changed to be both terminal and to act as entry into other courses at a given tier or in higher tiers, thereby providing for improved horizontal or vertical mobility of learners.

Cross-national comparisons of structures in technical and vocational education have been made very difficult because of wide differences in course specifications, large diversifications within and across the older tiered structure, and considerable variations in the nomenclature used to describe both the courses and the institutions responsible for them. Nevertheless, it is clear that the motivation behind the conversion of earlier simple structures into more elaborate and complex ones, especially at the older first- and second-tier levels, is the urge to respond effectively to the pressing demands for greater relevance and efficiency in the technical and vocational education system, especially in the context of the severe unemployment problems in the countries of the region.

Curricula for technical and vocational education

Curriculum development in technical and vocational education has undergone major and significant changes in the last decade. In countries where curriculum development has been institutionalized, considerable progress has been made in such formative actions as needs identification, task and content analyses, and establishment of specific intended learning outcomes. These actions have attempted to provide: a balance between orientation and broader considerations such as integrated foundational requirements of science and mathematics and of general education; flexibility to meet changing employment and occupational situations; and integration between practical aspects of the job situation and adequate academic foundations.

The departure from subjective decisions regarding these design aspects by a small group of 'experts' to the current involvement of a variety of personnel in developing curricula, including practitioners from the world of work as well as educational technologists, is a prominent feature in several countries in the region. As a result of these efforts, modular curricula, structured practical work manuals and learning package sequences, learning/teaching aids, and test item banks are appearing in most countries. Of these quality improvements, the most prominent are the variety of learning/teaching modules that are being developed or are already in use. The detailed task analyses on which these modules are based have usually been derived from actual performance by skilled master craftsmen and technicians, and hence lead learners towards skill achievement levels that are required in the real world of work. Further, these modules permit the grouping of identifiable sets of skills that are relatively self-contained and yet they permit horizontal development of related sets of skills as well as vertical development of skills of higher order. In the design of these modules, it has been possible in several countries to economize on both time and effort by utilizing appropriate pedagogical sequences that are selected and structured, and which provide for designed practice and reinforcement. Modular approaches have also helped somewhat to meet the short-falls in teacher or instructor competencies because of their self-learning characteristics.

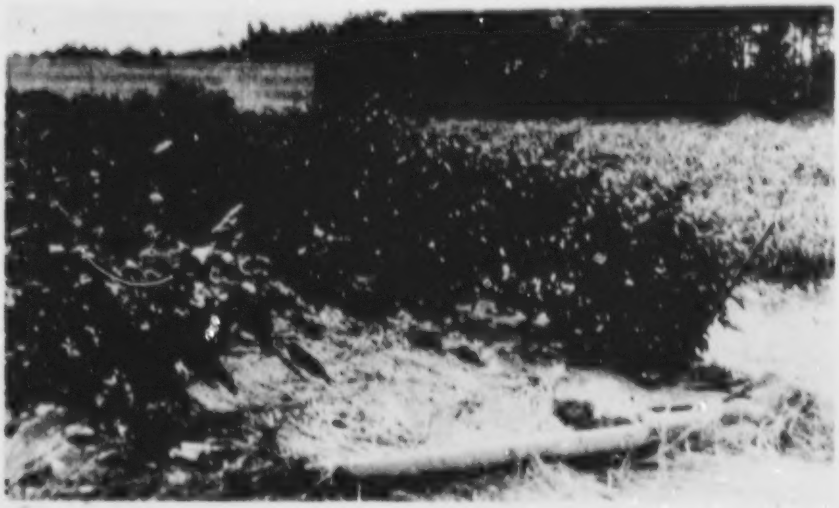
Actions for improvement have also been extended into the area of learner evaluation with improvements being made in the summative evaluative instruments. A clear movement into various types of criterion-referenced evaluation based upon criteria required by specific occupations in job situations is a marked feature in several countries in the region. The job and task analyses done in the design and preparation of curricula, and the modular learning sequences have assisted in the movement towards criterion-referenced testing.

A great variety of curricular innovations have appeared in technical and vocational education in recent years, ranging from instructional systems models to unstructured farm training on the job. In the more developed countries in the region, computer-assisted programming incorporating graphics and practical training has recently been introduced.

Perhaps the most pervasive curriculum innovations across most countries in the region relate to the concern for the inter-relationship between technical and vocational education and productive work. The recent emphasis on productive work integrated into technical and vocational education is partly a product of the search for relevance to working conditions in all elements of the education systems. Productive work relates theory

and practice to the workaday world, and includes the manufacture of saleable goods, the cultivation of agricultural produce or the provision of services for which demands exist. Students thus gain a knowledge of the myriad constraints in a work situation as well as an increased opportunity for obtaining marketable skills, and a broadening of occupational choices. In addition to contributing to objectives of general and technical and vocational education, the objectives of productive work also intend to contribute to community welfare through the provision of goods and services necessary to alleviate social problems and unavailable through regular means and the development of a skilled labour supply, especially in disadvantaged areas. Further, productive work is seen, at least in a few countries, as a means of paying back some of the costs of technical and vocational education while it proceeds, and of making maximum use of expensive capital resources which might otherwise remain idle.

Closely associated with productive work and the search for enhanced relevance is the trend towards more direct association between rural development and technical and vocational education. In particular, an emphasis on labour-intensive methods of production has been prominent in some countries. In this context processes in a given production situation have been resolved into those that remain capital-intensive for a narrow range of techniques, in the interest of high productivity, while the remainder are made labour-intensive to harmonize with the rural ecology. Local materials are generally used, even if they are of a lower standard than the most-desired material. Where such changes occur, the implications for technical



and vocational education are immediate. They imply more than the simple transfer of technology from the urban or modern sector. They involve a considerable degree of redesigning of processes and the generation of new technologies suited to rural situations, thereby extending greatly the formative actions in curriculum design and development.

Two aspects of curricula as practised in the region—ratio of theory to practice and productive work—are examined in detail further on.

Teacher education

Lack of teachers with suitable qualifications and practical experience, and in sufficient numbers, is a major problem in all the countries of the region, developed or developing. Most countries have established special institutions for the training of technical and vocational teachers serving various levels of the system. In some these institutions act simultaneously as curriculum development centres for technical and vocational education, and undertake both pre-service and in-service teacher training.

Part-time teachers at institutions for technical and vocational education are a common feature in many countries. These part-time teachers are generally employed because of their special knowledge or skill or first-hand experience in industry or other job situations, although their lack of pedagogical skills has often greatly reduced their efficiency as teachers. On the other hand, full-time staff have frequently been found to lack industrial experience, although the academic or pedagogical competencies may be adequate.

The recent improvements in technical and vocational education have their reflection in renewed efforts towards the parallel improvement of technical and vocational teachers. Many countries have introduced multi-pronged plans including emergency measures to tide them over immediate quantitative requirements, while simultaneously generating longer-term systematic development of a wide spectrum of teachers, including craftsmen, technicians, farmers and others drawn directly from the world of work. The return of academic teaching staff to industry, to be reoriented to the realities of actual work situations, has been attempted in several countries. To keep pace with rapid economic changes and specific requirements of industry, the upgrading of teaching staff has become an activity of considerable importance in most countries. In some this upgrading process has been built into the system, requiring teachers to enter into in-service training sessions after a certain number of years of service.

Resource materials for teachers, specifically supporting the new improvement actions in technical and vocational education, are being generated in almost all countries. Leaders have recognized that such resource materials must reach practising teachers and instructors, especially in non-urban areas, not only quickly, but on a continuing basis. It is also recognized that efforts must be made to provide resource material that meets the actual needs of the field personnel. Hence a mechanism for obtaining feedback on needs becomes essential. Both these aspects point to the establishment of dependable infrastructures for the development of resource materials, for their rapid distribution, for the collection of resource needs and the transmission of these needs to centres or institutions that will develop the resource materials. Efficiency of service demands that the nearer the production centres are to the location of the resource needs, the better. Some of these needs involve expertise found outside the Ministries of Education, including other development ministries such as industry, agriculture, and rural development. These, too, have to be incorporated in a service network that will ensure the flow of relevant knowledge at the appropriate time to the practitioners in the field. For this purpose knowledge-flow systems and decentralized networks for the delivery of resource materials on a continuing basis, and for gathering resource needs from field situations, are beginning to be established in a few countries in the region and are planned in others.

With the increase in autonomy of institutions and with extension arms of institutions being established in disadvantaged rural areas to deal with local-specific technical and vocational needs, countries implementing such programmes have seen that the teachers involved would require new competencies in such areas as curriculum planning and the development of learning materials. Teacher training in these few countries has recently begun to take this need into account, often on a 'production-cum-training' basis, where the development of locally-specific curricula and learning materials itself becomes a vehicle for the acquisition of curriculum planning skills.

With the advent of distance education as a significant modality in a few countries, the need for new competencies on the part of technical and vocational teachers involved has been recognized, especially those related to learner-teacher consultations, group discussion and tutorial sessions, integration of mass media like radio and TV in the learning sequences, and integrated intermittent practical work sessions, apprenticeships or on-the-job training.

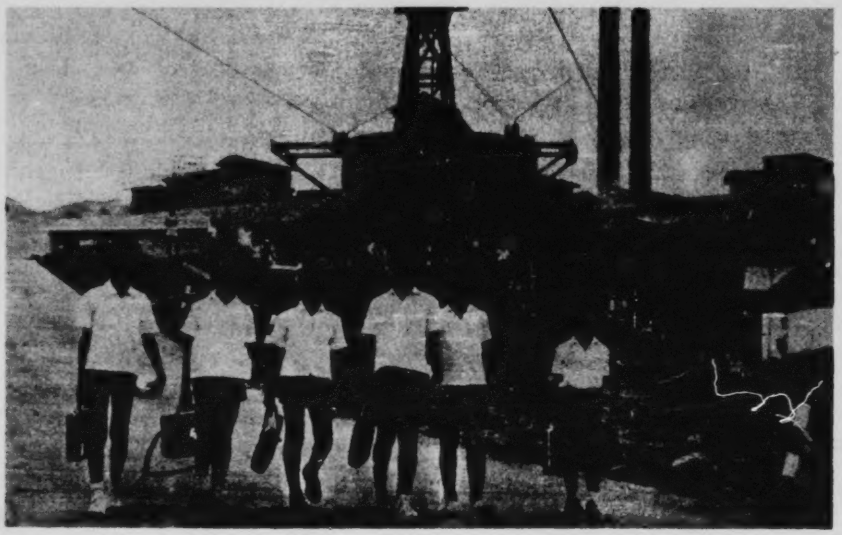
Issues and problems

Countries in the region have identified a variety of issues and problems related to technical and vocational education. Among the basic issues, the following have featured prominently:

- Unemployment, and consequent social dislocation and economic waste;
- Relationship of education/training and productive/practical work, that is, the relationship between the education system and the country's economic production systems;
- Expansion of opportunities to rural and other disadvantaged communities, with the dual purpose of community development and increased productivity, to support both social and economic growth; and
- Effectiveness of technical and vocational education systems, in terms of the planning and provision of appropriate courses, quality of teachers, curriculum development, and evaluation techniques.

In addition, the following specific problems have been repeatedly voiced, especially by the developing countries in the region:

- An increasing number of young unemployed and under-employed workers, and handicapped and other disadvantaged groups who should be provided with technical and vocational education;
- Scarcity of work for graduating students;



- Lack of co-ordination between governmental and private technical and vocational institutions and between institutions and industry;
- Shortage of experienced, qualified teachers, and recruitment and retention difficulties;

- Insufficient co-ordination between general education and technical and vocational education;
- Inadequacy of self-paced or self-instructional learning resources and locally-relevant textbooks;
- Difficulty in keeping courses up-to-date so that the needs of industry can be met quickly, in a time of rapid technological, economic and social change;
- Difficulty of devising a system, which is national in scope and with uniformity of qualifications, but is also sufficiently flexible to meet local needs; and
- Shortage of buildings and equipment and maintenance problems, in particular a need for low-cost scientific and technical equipment from locally-available materials.

The more recent emphasis on the integration of productive work in technical and vocational education programmes has brought further problems and issues, including the following:

- Appropriate choice of productive work on the basis of its value in the learning process, so that competencies developed inside the institution can be integrated with the realities of the work place and vice versa;
- Selection and training of teachers and instructors capable of integrating coherently cognitive learning and productive work, through convergence of appropriate task analyses;
- Planning and organizing mechanisms and infrastructures that operate in the interface between industry and the teaching institution to relate productive work to technical and vocational education;
- Evaluation of the effectiveness of the two forms of learning, in the institution and in the work place, and provision of remedial measures in both spheres of learning;
- Accessibility of suitable work places related to the skill requirements of the learners; and
- Reluctance of industrial enterprises to provide meaningful work experience for learners.

A third cluster of problems, discussed by participants at the Unesco Regional Seminar on Technical and Vocational Education (1979) are even more recent, and are related to global issues that concern all countries in the Spaceship Earth.[4] Energy, pollution and other ecological crises have profound environmental implications for technical and vocational education in the countries of the world, developing *and* developed. These implications, on policy as well as at all other levels through to implementation, manifest themselves in terms of a variety of aspects, such as new or alternative or transitional materials and technologies, pace and scale of operation, location, and management practices. A few countries have already initiated programmes in technical and vocational education which take into account these critical environment issues, but to many, these are just beginning to appear for consideration at decision-making levels.

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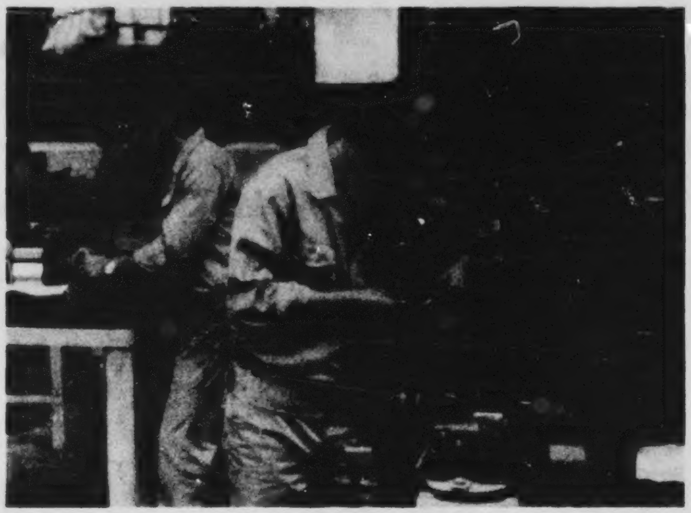
[4] Unesco Regional Seminar on Technical and Vocational Education in Asia and Oceania, 20-27 November 1979. *Report.* Bangkok, Unesco, 1980. p. 35.

Technical and vocational education, on its own, cannot solve the economic and social problems of a country. The actions in improvements indicated above are relevant only in the context of developments in the economic and social spheres. A basic assumption behind these improvements is that appropriate economic and social planning policy decisions have been made indicating the kinds and nature of the growth in the economy and in social welfare. It is also assumed that these decisions, once made, find reality in implementation. The technical and vocational education system can merely support such policies in their effective implementation. It cannot, of itself, solve the problems of the economy, such as its stagnation or unemployment, or the consequences of the impact of external forces. Given the appropriate policy and implementation parameters for economic and social development, improved and relevant technical and vocational education may be considered a *sine qua non* for the achievement of socio-economic goals.



Trends in technical and vocational curricula at the second-level of education

A major concern of the education systems in the countries in Asia and Oceania is re-orienting education towards the present needs of the individual and society, so as to contribute to the achievement of the social and economic development goals of each country. In the area of general education, this re-orientation encompasses the introduction of elements linking work and learning, and sometimes includes productive work. This is being achieved by incorporating work-based experiences in the curriculum for general education along with the relatively recent introduction of pre-vocational subjects. In general, however, these do not prepare the learners for immediate employment in occupational fields.

In technical and vocational education, both the linking of work and learning and the introduction of productive work in the curriculum aim to develop employable skills which are related to the needs for qualified workers in various productive undertakings, including self-employment. The present trends show that the curriculum development and implementation in technical and vocational education are moving strongly towards introducing productive work, along with the theoretical foundational knowledge required by present technological progress. New elements are being incorporated in technical and vocational education curricula that would provide for effective adaptability to rapidly changing technologies, more contemporary practical experience, and production-oriented practice on farms and in workshops in genuine working environments. These new elements aim to cultivate healthy attitudes towards productive work, inculcate proper working habits based on such aspects as economy of time and motion and on work safety, encourage economical use of material resources and develop high quality and quantity production, and enhance inventiveness. A review of the existing curricula in technical and vocational education in individual countries indicates the country-specific variations within the general strategy referred to above.

In Indonesia, the following four categories of subjects are included in the curriculum for technical and vocational secondary education:

– basic subjects relating to the education of good citizens (20 per cent out of a total of 3,600 hours over three years);

– basic knowledge such as mathematics, science and English as required to understand technological principles (12 per cent);

– theory and trade knowledge related to skills (18 per cent);

– the skill training itself, which represents 50 per cent. The main objective of this skill training is to equip youth with the basic skills in a certain technical field. After acquiring these basic skills, the learners will be able to develop them further within a minimum time after they enter employment in the field of their training.

In Japan, the curriculum content varies according to the type of Institution. This may be seen in the following three main categories of institutions: technical high schools, technical colleges and vocational training schools:

a) In the technical high schools the number of general education subjects is larger than the number of technical education subjects. The number of credits to be earned for general education subjects is 53 to 57 and that for technical education is 39 to 43. The total number of credits to be earned in the three years is 102.

b) In technical colleges the number of credits to be earned in technical education subjects is 92, being larger than that earned in general education subjects, which is 85. The students can graduate with a total of 167 credits, 75 in general education subjects and 82 credits in technical education subjects. Within those requirements, there is some room for choice of subjects in the curriculum. One significant characteristic of the curriculum for technical colleges is that each college is free to decide on the annual allotment of its technical education subjects to suit the nature and character of the college.

c) In the vocational training schools the vocational training consists of 20 per cent general education subjects and 80 per cent practice in various technical trades. This illustrates that in these schools the curriculum is formed mainly with a view to producing skilled operators in various fields.

The curriculum content of Japanese technical colleges is comparable to those of some polytechnics in other countries of the region.

In India, the curriculum for the three-year polytechnic course in civil/building trades offers the following main groups of subjects to the students. During the first year, they study English, mathematics, applied science (physics and chemistry), technical mechanics, surveying, materials of construction, drawing and practical survey. In the second year, they study construction practice, strength of materials and theory of structures, hydraulics, transportation engineering, surveying, practical survey, civil engineering drawing, hydraulics laboratory and strength of materials laboratory. In their third year, they receive knowledge in some applied subjects like structural engineering, irrigation, public health engineering, construction management and building technology. They also do a practical project.

This example gives an illustration on sequencing of the main groups of subjects, which are related to the practical application of the theoretical knowledge through project work.

In Malaysia, learners are provided with both vocational skill training and general studies. In the secondary vocational schools curriculum, 29 per cent is devoted to general subjects and 71 per cent to vocational training, which itself consists of 30 per cent theory and 70 per cent practice. On-the-job training is optional in the vocational schools, while in the polytechnics it is compulsory.

Another feature of the Malaysian curriculum is that there is no difference between vocational education programmes offered in urban areas and those in rural areas, while in some other countries of the region the curricular contents vary to a certain extent according to the location of the institutions–in urban or rural areas, as for example in Australia, India, Japan, New Zealand, the Philippines and the Union of Soviet Socialist Republics (USSR).

In Pakistan, four categories of subjects are included in the technical and vocational curricula:

- General knowledge subjects: 4 per cent;
- Basic science subjects: 6 per cent;
- Special technical subjects: 20 per cent (related to the skills to be taught);
- Practical skill training: 70 per cent.

The Government of Pakistan has recently set up a Council of Technical Education to make necessary revisions in the curriculum and to bring it into conformity with the changing requirements of industry and the socio-economic needs of the country. Since the survey undertaken by this Council indicated that curricula, syllabuses and duration of vocational courses offered by various technical training institutes in Pakistan were not uniform and the training imparted in these courses was not in conformity with the changing requirements of the industry, the National Committee on Technical Education decided that uniform curricula of vocational courses should be developed for the whole country in the light of the education policy for the period 1972–1980.

In most curricula, the ratio between theory and practice reflects the present trends to prepare technical manpower at various levels of qualification, according to the predominant nature of the learners' future work, in two main categories: either as skilled workers, tradesmen, and machine operators, or as foremen, technical supervisors, designers and the like. The general tendency is for more practice and less theory in the field of vocational education training workers of the first category; and more theory and less (highly-specialized) practice in the field of technical education training technicians belonging to the second category.

In Bangladesh, this ratio between theory and practice is:

- In vocational education, 20 per cent theory and 80 per cent practical training; and
- In technician education, 40 per cent theory and 60 per cent practical training.

In the Philippines there are three main types of curricula, in which the ratio between theory and practice is approximately as follows:

- for craft courses–preparing semi-skilled workers – 30 : 70;
- for vocational courses–training skilled workers – 50 : 50; and
- for technical courses–preparing skilled workers – 60 : 40;

which is subject to revision with the newly-formulated policy for curriculum planning under the leadership of the Technological University of the Philippines (TUP).

In most Asian countries the various curricula in the field of technical and vocational education are presently being developed with a tendency to incorporate a variety of strategies attempting to stimulate the development of productive skills. Most experiences in the countries of the region show that the main strategies adopted are the incorporation of more and more elements of productive work through the implementation of production-oriented projects, and specifically-designed skill-oriented workshop practice simulating industrial environment. A clear demarcation between these strategies is however not visible in many countries of the region. The following examples reflect the merging of these strategies as they manifest themselves in some countries.

The experience of Bangladesh reveals that students at the vocational level are required to perform special production jobs in the training workshops, while at technician level the jobs are not particularly production-oriented. The aim of workshop practice at this level is to develop in the learners the basic skills required for technician jobs.

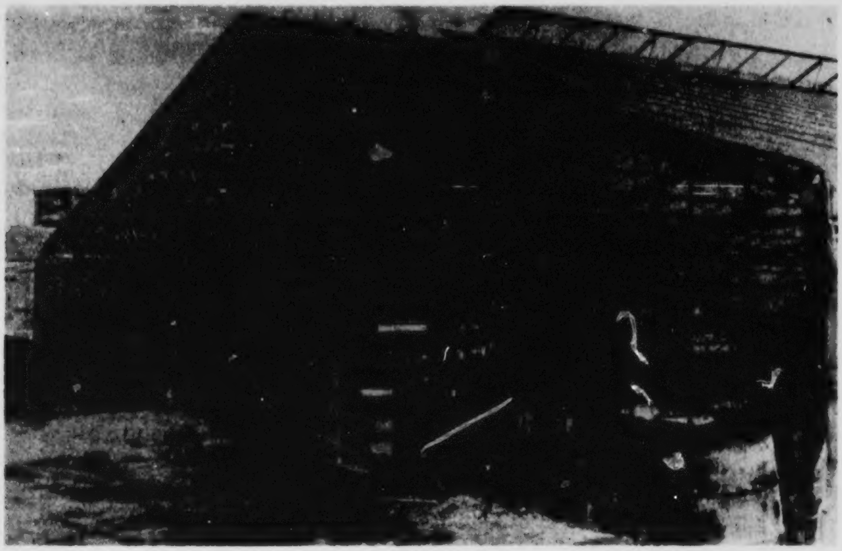
In Burma, the present technical, agricultural and vocational education curricular contents are tailored to link teaching with on-the-job experiences by emphasizing the development of occupational skills which will be most useful in the practical fields and most relevant to the needs of the country.

In India, the relatively new Community Polytechnics implement a revised curriculum with many projects incorporating productive work included in workshop practice, such as carpentry, wood-work and metal-work construction practice, house wiring, concrete construction practice, welding and plumbing.

In the 'sandwich course' with industrial orientation, the production-oriented curriculum of each course provides the most essential training in the industry and guarantees that diploma-holders will fit the needs of the prospective industrial employers. The trainees gain actual workshop experience during a period of 12 months spread over two-and-a-half years. The sandwich course scheme has brought major changes in the structure and organization of the technical and vocational education curricula of polytechnics.

In Japan, practical skills training is based on contemporary technological development. In the civil and construction engineering fields, for example, remarkable progress is being made in construction technology. There are new innovations and developments in construction methods, techniques and design. One of the tasks of technical and vocational education in this field is to introduce these new technologies into the curriculum. Along with relevant curriculum changes, educational facilities are also being upgraded by introducing audio-visual facilities and new experimental equipment.

Today's construction technology in Japan is not limited to simple construction techniques, but covers a wide area of subjects such as environmental control techniques, economics, ecology, and so on. This has



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brought into existence an interdisciplinary curriculum that offers ample opportunities for the development of new, highly-sophisticated skills for the modernized technology.

In the curriculum of various vocational courses in Pakistan very strong emphases are placed on skill training. Three days per week are allocated for that purpose. The main objective of this training is to equip learners with those basic skills required in the field of their future employment, according to the technical profile of the courses.

In the Philippines, the technician education curriculum contains some components of skill training which are being pursued through the implementation of multi-skill projects in workshop practice. The practical skills training adopts a ladder-type approach, with a step programmed for each level of skill in a series of graded levels necessary for the proficiency required in a given technical field.

In Singapore, a scheme for productive work has been carried out since 1973. The objectives are: the integration of training and production through course work, the rationalization of the execution of production at the training institutes, and the reduction of the cost of training by recovering part of the expenses through the sale of products and services. Under the scheme, staff and trainees are engaged in various production activities which expose them to the experience of production work under factory conditions. Furniture, vehicle upholstery, general welding, plumbing and pipe-fitting, offset lithographic printing, television servicing

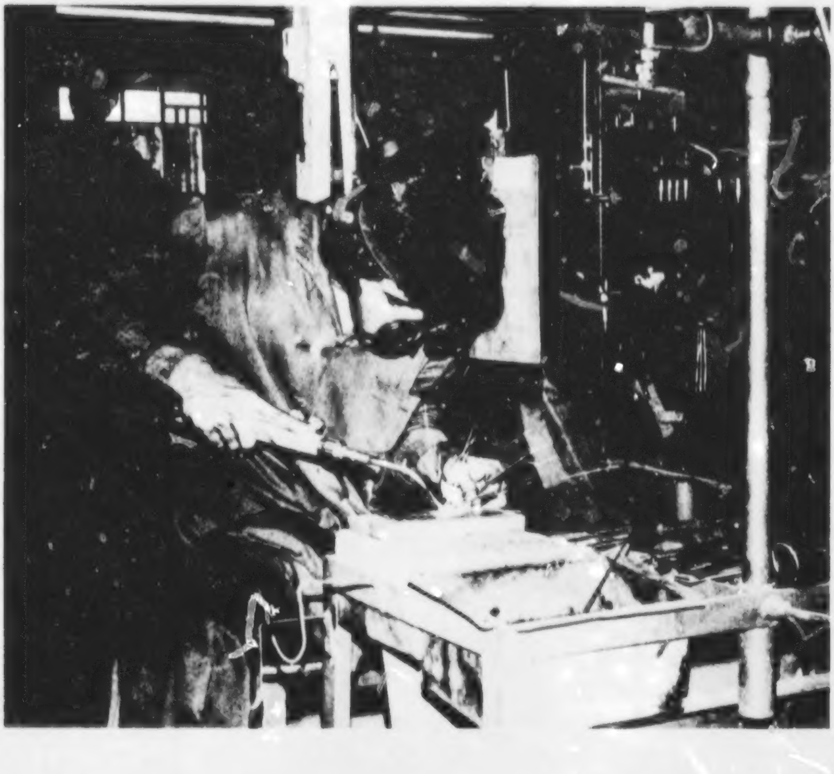
repairs and spray-painting of motor cars are some of the more popular types of production work undertaken. Realistic practical training is built into the curriculum wherever possible. Industrial attachment of six weeks' duration for Industrial Technician Certificate (ITC) trainees in various industries is another form of training. As industry is the major consumer of industrial training, their involvement in curriculum planning conducted by the Industrial Training Board is crucial. In recognition of this important role, Trade Advisory Committees are set up to exploit the expertise and experience of professionals practising in the various trade areas. The curriculum provides for systematic, planned visits to industrial outfits, aiming to enhance industrial involvement in the training provided by the Industrial Training Board. Discussions at these visits also provide important feedback on the Board's operations and effectiveness.

The practical productive skills training incorporated in technical and vocational education curricula in Sri Lanka is based on the past experience of the age-old apprenticeship training. However, older forms of craftsman training were found to be inadequate for the country's expanding industrial ventures. In the past, skilled workmen were trained by the method of apprenticeship, working under a reputed master-craftsman for a number of years and learning a trade skill under his guidance. There was no established skills-oriented curriculum or specific method followed by these master-craftsmen. The new curricula of the National Apprenticeship Scheme provide special in-plant training for technicians graduated from technical institutes and for undergraduates who follow training in technical fields. This training is of one year's duration. At present, the curricula of the National Apprenticeship Scheme cover courses for 145 different crafts and nine special apprentice courses aimed at preparing trainees to meet the requirements of industry. In addition, the National Apprenticeship Scheme curriculum provides in-plant training to learners from technical institutes and the university.

The outstanding advances of some countries in curriculum planning related to productive work have a deep potential of shareable experiences which could benefit other countries. There is an increasing awareness of the need for inter-country co-operation in the area of technical and vocational education in general, and in curriculum design related to the countries' developmental needs in particular. This calls for the strengthening of inter-country collaboration in efforts to renew technical and vocational education curricula according to specific needs for the benefit of future generations.

SECTION TWO

TECHNICAL AND VOCATIONAL EDUCATION IN THE COUNTRIES OF ASIA AND OCEANIA



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AFGHANISTAN

by M. Osman

Introduction

Education in the Democratic Republic of Afghanistan is considered the most important key to practically all aspects of social and economical development of a society. Realizing this, the Afghan Revolutionary Government has focused its attention on paving the road to the extent to which it could lead to a sound and reliable education. Hence, the basic lines of the revolutionary duties of government have given higher priority to the expansion of free intermediate, higher and vocational education and to the review of curricula of schools and of institutions of higher learning, in order to train academic as well as professional cadres required for the overall social and economic development of the country.

This mandate calls for a broad approach to education in terms of objectives and their relative outcomes, an approach which is currently under way to seek and formulate a base to provide better educational opportunities for the society. It is anticipated that the educational sector will indeed become the key to the country's social and economic development.

The system of education is centralized and education is free at all levels. Students are provided books, supplies, stipends, and room and board if needed. The government controls all formal and non-formal educational and training institutions. Two ministries, the Ministry of Education and Ministry of Higher Education are in charge of all aspects of their respective sectors of education.

The Ministry of Education is responsible for all schooling from kindergarten through secondary education, with the exception of technical and vocational education, which also covers secondary–and to some measure two years beyond secondary education–and has been very recently transferred to operate under the Ministry of Higher Education. The Ministry of Higher Education is mainly responsible for all higher learning beyond secondary education except for teacher training institutions, which are under the authority of the Ministry of Education.

Organization of the Technical and Vocational Education Department

The Department of Technical and Vocational Education is headed by a president and a vice president. It consists of three main academic divisions: Technical and Arts, Agricultural, and Public Administration. Each division is administered by a general director. Presently there are three technical training institutions, six mechanical, seven agricultural, six commerce and management, three arts-and-crafts and one music school within the department. Details and the line of authority are shown in Chart 1.

The secondary technical and vocational school system is not uniformly oriented. The Five-Year Socio-Economic Plan, currently being developed, will undoubtedly modify education in Afghanistan, but it can be expected that an expansion of educational facilities and emphasis on vocational education will again be mandated.

Planning and financing

Planning of technical and vocational education at the macro and micro levels is done by the Ministry of Planning as part of the National Economic Plan. The Ministry of Higher Education functions at the management level as follows:

1. Designing curriculum with the co-operation of schools' academic staff, specialists and to some extent industry representatives.
2. Designing and location of institutional buildings.
3. Provision of hardware, software and other academic and recreational facilities.
4. Staffing of institutions.
5. Inspecting and evaluating of institutions.
6. Introducing graduates to the manpower department (central statistics) for placement.

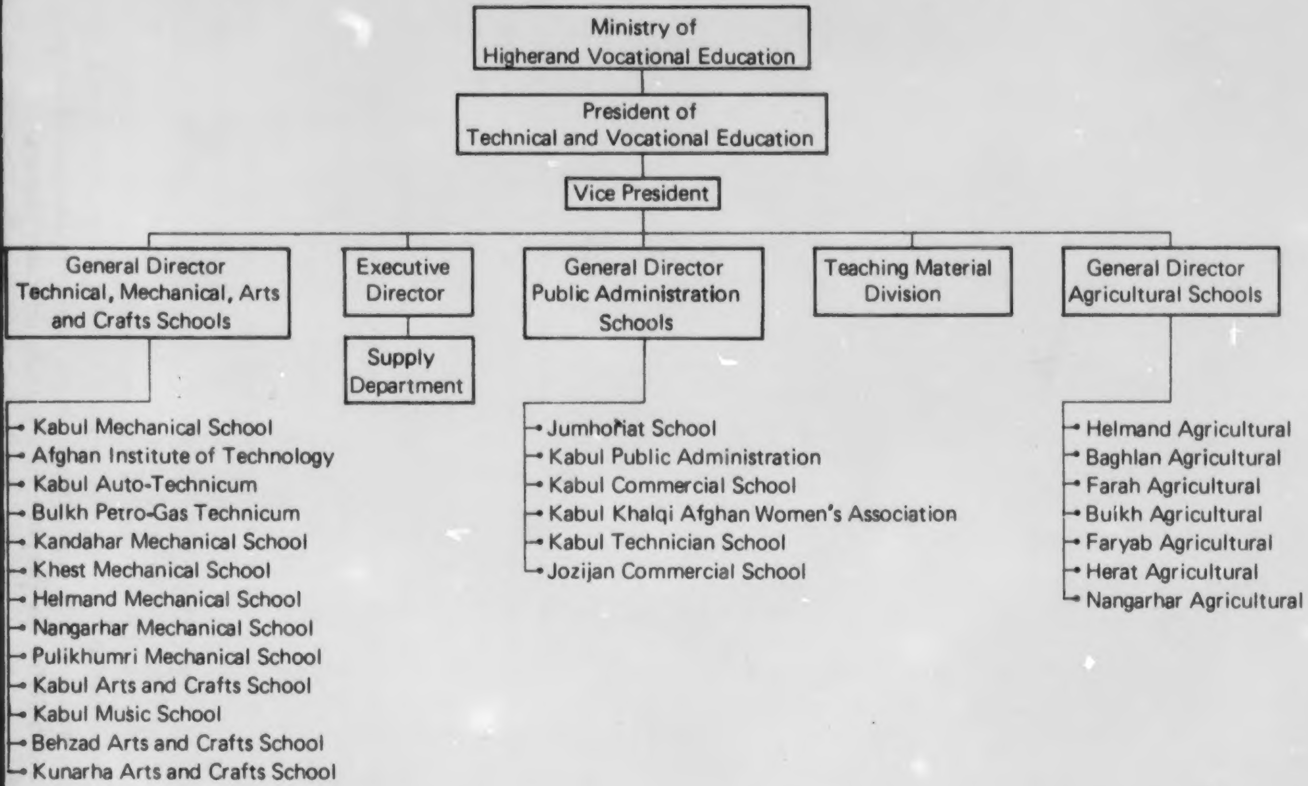
Education, from kindergarten through university, is offered free from any sort of charges. The government finances all the educational expenses including textbook services, cost of room and board, and stipends. Educational cost varies from institution to institution due to the nature of their vocational activities. The yearly cost of each individual student in vocational schools is calculated as follows:

Non-dorm student	Afs. 16,400 or US $400
Dorm-student	Afs. 28,360 or US $709

National system of technical and vocational education

Enrolments. In 1974, Technical and Vocational Education was provided by 15 institutions with a total enrolment of 4,747. The growth of

Chart 1. Organizational chart of Department of Vocational Education, Ministry of Higher Education


Ministry of Higherand Vocational Education
President of Technical and Vocational Education
Vice President
General Director Technical, Mechanical, Arts and Crafts Schools
Executive Director
Supply Department
General Director Public Administration Schools
Teaching Material Division
General Director Agricultural Schools
Kabul Mechanical School
Afghan Institute of Technology
Kabul Auto-Technicum
Bulkh Petro-Gas Technicum
Kandahar Mechanical School
Khest Mechanical School
Helmand Mechanical School
Nangarhar Mechanical School
Pulikhumri Mechanical School
Kabul Arts and Crafts School
Kabul Music School
Behzad Arts and Crafts School
Kunarha Arts and Crafts School
Jumhoriat School
Kabul Public Administration
Kabul Commercial School
Kabul Khalqi Afghan Women's Association
Kabul Technician School
Jozijan Commercial School
Helmand Agricultural
Baghlan Agricultural
Farah Agricultural
Bulkh Agricultural
Faryab Agricultural
Herat Agricultural
Nangarhar Agricultural

schools in terms of number and enrolments by type of institution are given in Tables 1 and 2, below:

Table 1. Enrolment in secondary vocational schools, 1974-1978

Type of institution	Enrolment				
	1974	1975	1976	1977	1978
Technical	1 264	1 297	1 773	2 000	2 189
Mechanical	904	894	1 354	1 744	1 978
Agricultural	846	833	2 195	3 044	4 245
Commerce and management	1 473	1 483	1 583	1 790	2 103
Arts and Crafts	260	200	368	553	799
Music	30	54	16	97	64
TOTAL	4 777	4 761	7 289	9 228	11 378

Table 2. Numbers of schools of different types, 1974-1978

Type of institution	1974	1975	1976	1977	1978
Technical	3	3	3	3	3
Mechanical	3	3	3	4	6
Agricultural	3	3	7	7	7
Commerce and management	4	4	4	6	6
Arts and crafts	1	1	1	3	3
Music	1	1	1	1	1
TOTAL	15	15	19	24	26

Almost all technical and vocational education offered within the frame of the Ministry of Higher Education is formal and full-time in its nature, except evening courses that are provided by some of the technical schools and are on part-time bases.

Technical schools normally offer four academic years. Post-secondary education is available in some of the schools for a duration of two or three years. The training of vocational and technical school teachers is provided at Kabul University in the Department of Vocational Teachers Education (VTE). The programme is four years long and has had little impact on the preparation of vocational and technical teachers. The majority of the country's Technical, Mechanical, Arts and Crafts, Agricultural and other vocational teachers are partly the product of their respective schools and partly university graduates. The preparation of highly qualified teachers in these technical and vocational areas—which requires further and advanced training and its pursuance—is not possible within the country and is usually done abroad. Some fellowships and scholarships are also available for the purposes of attending refresher courses.

At present there are few opportunities for the systematic training of technical manpower for industry except for a limited number of establishments such as the textile factory in Bagram and the fertilizer factory in Mazar-i-Sharif which limit the training to their own staff. Some government departments do make arrangements to train their staff for specific functions. The most important is the Telecommunication Training Centre run by the Ministry of Communication. Radio-TV Kabul has its own training centre. A training centre is run by the Ministry of Mines and Industry at Kabul for training personnel for small-scale industry. The Civil Aviation Department of the Ministry of Transportation runs its own training institutions, including Meteorology, Aviation Technology, and Hotel Management. Similarly, Nursing schools are run by the Ministry of Public Health.

The structure of the technical and vocational education system is shown in Chart 2.

Curricula

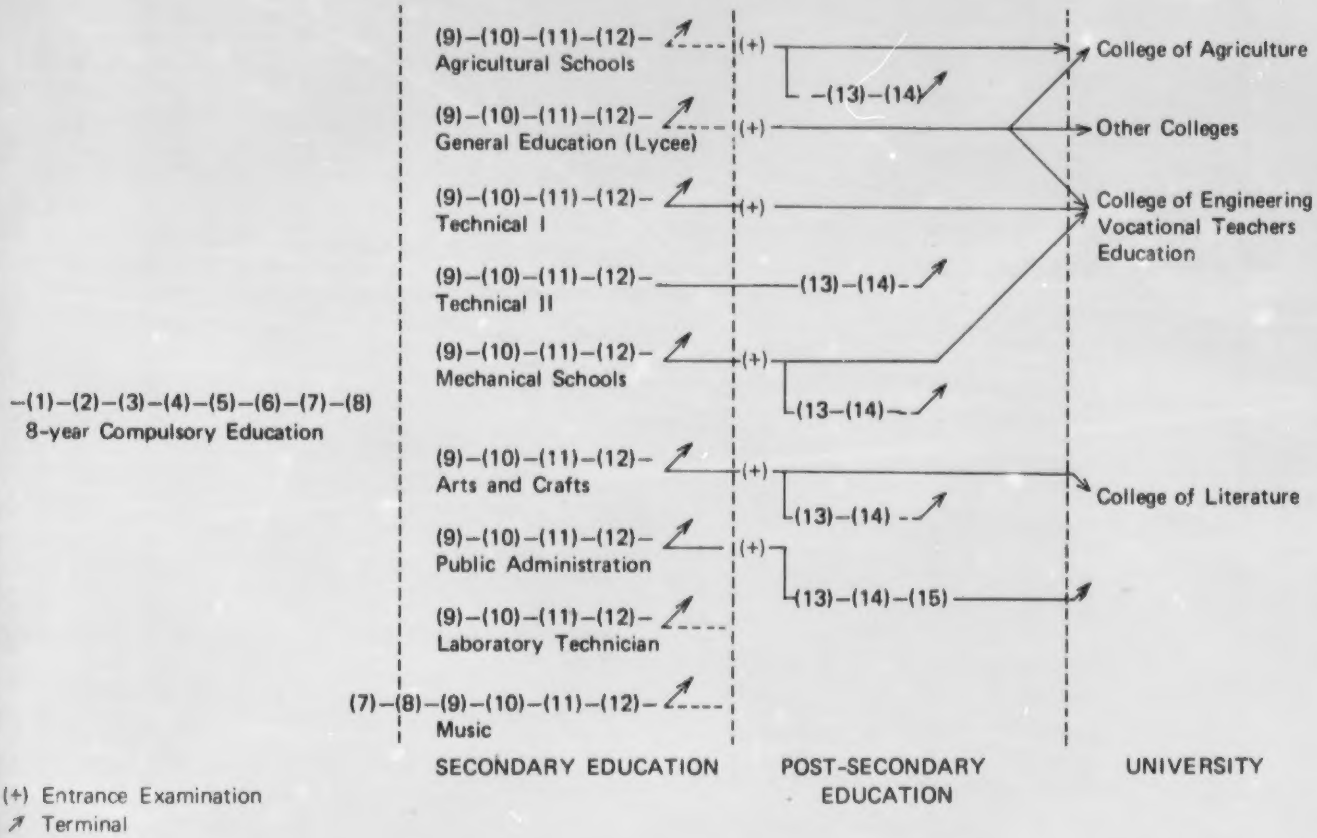
Currently there are at least five distinct types of technical and vocational education programmes adopted by the vocational institutions which are directly supervised by the Vocational Education Department. These are technical, mechanical, arts and crafts, administration and agricultural; each is designed to meet specific needs as required for the country's economic development.

Technical institutions are intended mainly to train qualified technicians to occupy positions somewhere between the engineer and the skilled worker in industry. The Afghan Institute of Technology offers specializations in electricity, electronics, civil engineering, building construction, automotive technology, machine-tool technology and cartography.

Departmental programmes are composed of both vocational and general courses of which content 36 per cent is vocational and 64 per cent general. The Bulkh *Technicum* offers courses in geology and petro-gas exploration, refinery technology, equipping petro-gas establishments, mining of petro-gas, and mining of useful solids. The relative emphasis on vocational and general subjects in this institution is approximately equal. The Kabul *Technicum* offers courses in electricity, auto-technology and metal work. The percentage of vocational and general subjects is about 55 and 45 respectively.

The country's mechanical schools are responsible for training skilled workers. Courses offered by this type of school are generally similar and encompass radio, electrical power, automotive repair, building trades and

Chart 2. Structure of Technical and Vocational Education, Afghanistan


–(1)–(2)–(3)–(4)–(5)–(6)–(7)–(8)
8-year Compulsory Education
(9)–(10)–(11)–(12)–
Agricultural Schools
(+)
–(13)–(14)
(9)–(10)–(11)–(12)–
General Education (Lycee)
(+)
(9)–(10)–(11)–(12)–
Technical I
(+)
(9)–(10)–(11)–(12)–
Technical II
(13)–(14)–
(9)–(10)–(11)–(12)–
Mechanical Schools
(+)
(13–(14)–
(9)–(10)–(11)–(12)–
Arts and Crafts
(+)
(13)–(14) –
(9)–(10)–(11)–(12)–
Public Administration
(+)
(13)–(14)–(15)
(9)–(10)–(11)–(12)–
Laboratory Technician
(7)–(8)–(9)–(10)–(11)–(12)–
Music
College of Agriculture
Other Colleges
College of Engineering
Vocational Teachers
Education
College of Literature
SECONDARY EDUCATION
POST-SECONDARY
EDUCATION
UNIVERSITY
(+) Entrance Examination
↗ Terminal

machine tools. Courses are highly work-oriented. Fifty per cent of the time is budgeted for the workshops (practical work) and the other 50 per cent for general and related subjects.

Arts-and-crafts schools are responsible for training skilled workers in the fields of carpentry, building construction, printing, ceramics, arts and design, textile and tailoring. The programme in each of these specializations is designed so that it comprises roughly 60 per cent general and 40 per cent vocational subjects. Administrative schools in their turn are training skilled personnel in administration, commerce and secretarial fields. Forty-five per cent of the subjects taught are vocational and 55 per cent general subjects. Agricultural schools train skilled personnel in plant science, animal science, agricultural engineering, economics and extension courses. The relative emphasis on vocational and general subjects is 40 and 60 per cent in that order.

Relationship of curricula to productive work

Economic and social development involves all economic and social sectors. Here we focus our attention only on the manpower requirements and the incorporation of factors in preparation for these in the curricula. Productive areas as a whole consist of agriculture, industry, geology, construction and transport. Each area can be sub-divided to an endless list of jobs that will require different levels of education. Since the description and analysis of these narrow and specific jobs with regard to our present technological stance would be too far ahead of time, the training of multi-skilled workers is recommended over single-skilled, and a modular training over specialized training. Hence the curricula of the technical and vocational schools are mainly based on the assessment of manpower requirements in those areas considered important to the economic development of the country and the availability of educational facilities with a broad base of skills that are generic to a variety of jobs performed.

Efforts have been made to incorporate appropriate and fully equipped workshops and science laboratory apparatus needed for the successful implementation of the curricula. In spite of this some of the vocational schools are not yet well enough equipped to ensure the provision of quality education.

There are certain practical kinds of work that are practically impossible to accomplish within the schools. In these circumstances the co-operation of related industries is requested, although there is as yet no organization in Afghanistan to bring together representatives from industry and educational institutions in order to achieve co-operation. Experiences show however that industries are willing to extend their co-operation if requested to do so through official channels.

Co-operation between technical education and industry

1. Building-construction students get training on construction projects under supervision of their teacher.
2. Mining-technician students are sent to mining projects between courses. The companies are very co-operative in providing special required outfits and housing for students. Food and transportation are provided by the government.
3. Industrial-management students are required as part of the curriculum to study nine months in the institution and three months in industry.
4. Industries allow students to visit them in organized groups under school supervision.
5. Industries provide instructors on a part-time basis if needed.

Problems

Not only the developing countries but developed ones as well, in spite of their advanced economy and long experience, face various kinds of problems due to the nature of their technical and vocational training. The Democratic Republic of Afghanistan, which is at the beginning stage of its technological development, encounters many problems indeed. Some of these which have been identified fall mostly under three headings, as listed below.

A. **Physical facilities and equipment**
   1. Shortage of school buildings
   2. Not enough equipment and supplies
   3. Lack of regular maintenance

B. **Staff development**
   1. Insufficient number of trained teachers (vocationally oriented)
   2. Shortage of refresher and pedagogical courses
   3. Lack of in-service training
   4. Few opportunities for vocational and technical education seminars

C. **Curriculum development**
   1. Absence of a curriculum centre
   2. Lack of an advisory board
   3. Insufficient co-operation and communication between technical education and industry
   4. No appropriate evaluation of curricula and follow-up studies of the graduates.

Curriculum development is a difficult job to begin with. It is believed that no technical education programme is perfect at any time, particularly at the beginning. By a perfect programme is meant one which adequately touches all aspects of individual needs as well as the needs of the respective community and industries to a reasonable extent. A curriculum can be improved to approach perfection but it can never be perfect.

There is always thus some degree of divergency from the objectives; yet by periodically examining and improving the curriculum this divergency can be reduced. To rationalize this statement, let us look at a few of the problems that are encountered in curriculum development. The greatest problem in developing curriculum is the difficulty in providing materials which meet the interest and need of participating individuals. Because of different experiences, needs and interests—and industry's demands—any norm established as a reference for developing curriculum may not satisfy a society or a group as a whole. Similarly no one model of curriculum has been devised to cover all bases and work in all instances.

Most technical and vocational schools have a three-dimensional objective, such as to prepare individuals for entry into the work force, to provide mobility within the field of specialization and to provide a basis for further education. This diversity of objectives by itself tends to give rise to the inclusion of irrelevant materials in a curriculum. Some other factors in curriculum development worth careful consideration:

1. Schools adopt a philosophy of education without difficulty but the real challenge comes in the adaptation to everyday instructional practices.
2. Schools often fail to state their philosophy and objectives clearly and explicitly.
3. Curriculum specialists after long study outline a curriculum, but the content of subjects is dictated indirectly by textbook writers.

Plans for the future

The present intention, as is plainly reflected by our country's first Five-Year Economic Development Plan is toward greater industrialization in the country. The Vocational Department, taking this in account, must increase technical and vocational programmes to meet the ever-increasing demands of the present and future industries.

The programmes are to be designed to have a broader base in order to be generic to various fields of work. They will be narrowed down to more specialized fields as our industries develop.

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An authoritative committee, composed of representatives of the College of Economics, College of Law, Institute of Accounting and Administration, Prime Ministry's Department of Vocational Department and other professionals was assigned to review the curricula of administrative schools and make necessary revisions. The committee reviewed the related curricula pertaining to each of the professions and made the required revisions in terms of the systems, relative percentages of theory and practical work and other curricular activities.

1. An advisory board of inter-ministerial members has been formed.
2. The first Five-Year Plan shows a need for 105,000 skilled workers in different sectors of the world of work. Two mechanical schools have been urgently established and the establishment of similar schools is continuing.
3. The Afghan Institute of Technology will be re-equipped with modern production machinery to provide more practical and productive opportunities. The school will run as an experimental or pilot school. The present curricula are being revised but the four-year educational system will be maintained.
4. Two new agricultural schools with a greater area of productive farming land will be established from a loan funded by the World Bank.
5. Seven schools of mechanics are to be built and equipped with the assistance of the Asian Development Bank.
6. The establishing of a Building Construction Technicum which might have five main construction fields is currently under study.

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AUSTRALIA

by A.M. Watkins and I.B.G. Burns

Introduction

Education for a vocation has had a place in Australia from the early days of European settlement, if we take 'vocation' to mean those activities pursued in a regular manner with the objective of earning an income. If we were bold enough to broaden the meaning of the word to include activities pursued to sustain life, then vocational education extends back thousands of years with the training in skills of the Aboriginal people. Generally, we have not been so bold as to define vocational in this way but there may come a time in the near future when we will. The era of lengthy, rigid, status-filled programmes is drawing to a close.

Australia's governance is by means of a federal system, with the original States ceding certain powers to the Commonwealth government while retaining responsibility for a wide range of activities. Education is one such area, where the various States have full constitutional authority. The result is to some degree like having six nations each going its own way. Fortunately, all speak the same language, and there has now developed an effective partnership between them and the Commonwealth with each making contributions to the operation of the whole system.

During 1977 the Commonwealth Government took significant steps to achieve greater co-ordination of post-secondary education through the establishment of a Tertiary Education Commission, with responsibility for universities, advanced education and technical and further education. A significant objective of the Government was to achieve greater co-ordination of vocational preparation. This concern was also reflected in the appointment, in 1976, by the Commonwealth Government, of a major Committee of Inquiry into Education and Training.

Responsibility for technical and vocational education

No one body has overall responsibility for planning technical and vocational education in Australia. At the national level there is a Technical and Further Education Council, which is one of three post-secondary education councils advising the Tertiary Education Commission and Federal government. The TAFE Council has a full-time chairman (appointed for a period of up to seven years) and eight other members. Although not required by the Act establishing the Council, all of these members act in a part-time capacity. The function of the Council is to inquire into and advise the Minister and Tertiary Education Commission on matters relating to technical and further education. The principal means for providing such advice is the triennium report which sets out priorities and funding levels.

The other eight bodies are at state or territorial level. Each of these has adopted its own organizational structure with operational and planning responsibility resting largely in either education or further-education departments. These may also determine policy but some States vest this function in post-secondary education commissions or technical and further education councils.

The national system

Most activities are concentrated in the capital cities and larger provincial centres because that is where the people are, but serious efforts are made to take vocational education to wherever it is needed. There are about 1,000 centres through the country, ranging in size from those rivalling the bigger universities to those in rural areas with only a dozen or so enrolments. Isolated participants are reached by correspondence or radio and television, and even by railway carriages and caravans.

Generally the provision of technical and vocational education is the responsibility of a college, located in a population centre, with study centres in the surrounding area acting as agents for the college. Depending on the size of the institution and the needs of the community, courses may be provided from a range of approximately 800 programmes. These may be short (a few hours) or extend over a number of years and total eight or nine hundred hours. Few courses are offered only on a full-time basis as most students are engaged in full-time employment (5 per cent of students study full-time). The vast majority of courses are directed towards vocational skills, although many colleges offer programmes of a leisure-oriented nature as well as preparatory programmes.

Most of these are the responsibility of middle-level colleges, but agricultural colleges and colleges of advanced education contribute to a lesser degree to education at this level. There is also some vocational training provided by private, profit-oriented business or other specialized colleges.

Secondary schools see themselves as being primarily concerned with general education but many offer options with a vocational bias. This is particularly so in the state of Victoria where more than 100 technical schools have traditionally shown a concern for the development in their students of a variety of skills which are quite vocational in nature.

Increasing concern is being shown by educators with regard to the transition of students from secondary schools to further education. Along with other countries Australia is seeing the development of link programmes, where secondary schools send interested students to nearby vocational institutions for specialized teaching of vocational skills. This process serves both to teach young people new skills and to help them gain an idea of what is involved in some vocational fields.

At the same time, the technical and vocational education system has very strong links with the world of work. Industry and commerce are represented on governing or advisory councils at both system and institution levels, and in the field of curriculum they make significant contributions. In one State, all basic- and middle-level vocational programmes are approved by bodies comprising few or no professional educationists.

Institutions and attendance patterns

As mentioned earlier, secondary schools are largely oriented towards general education. Their vocational courses tend to be subject options, or involvement with nearby technical colleges through link courses. In a number of places there have been developed pre-vocational or vocational orientation programmes. These are normally full-time and give the participants experiences in a number of vocational areas, as well as continuing their general or basic education. Programmes such as these are found at or near the end of secondary schooling. There is thus a growing awareness in Australia that schools should relate more to the adult community.

Full-time attendance in the post-school sector, which currently amounts to about 43,000 students, is mainly in the preparatory, para-professional, and non-trade skills areas, and these are concentrated in the more industrialized and populous states of New South Wales and Victoria. Most people undertaking full-time studies are enrolled in colleges but some attend technical schools located nearer to their homes. Very often the programmes offered on a full-time basis are the first half of a course of study, with the balance being taken part-time. Where the whole course is available for full-time students we find that it is usually in the area of business studies or some form of engineering. Full-time students tend to be younger than part-timers, with females outnumbering males.

Part-time programmes fall into six categories or streams of study: preparatory, trade, para-professional, professional, other skilled, and adult education. In any one or more of these there are various fields of study: applied science, art and design, building, business studies, engineering, rural and horticulture, music, para-medical, general studies, and miscellaneous industrial and personal services.

Attendance in part-time programmes is typically two-to-four hours a week, often in the evening, with some courses requiring attendance at college for a whole day or more each week. This pattern is followed, for trade courses, for three years, and for para-professional courses for three, four or even five years. Other courses are considerably shorter.

Growth of vocational education

The last five years have seen a rapid growth in the numbers of people taking part in technical and vocational education, in much the same way as universities and advanced colleges in earlier years. A number of factors have contributed to this situation, in particular the societal and economic changes brought about by new technologies and the increasing cost of energy.

The community has realized that it has not attached enough importance in the past to the development of vocational skills, and it is doing something about it. This is quite evident when we look at the growth of enrolments in the period from 1973 to 1977. In 1973, fewer than 350,000 people were enrolled in vocational or preparatory courses. In 1977, the latest year for which statistics are available, the figure had climbed to more than 560,000, an increase of 60 per cent in five years. This phenomenal rate of growth has lessened substantially but is still more than double the rate of population growth. As far as participation in vocationally-oriented education is concerned, in 1977 nearly 19 of every 100 Australians were enrolled in some such course.

Involvement of employment sectors

The involvement of the employment sectors in the planning and organizing of technical and vocational education varies from state to state, but is generally quite extensive.

A number of systems have advisory or executive councils which function at the state or college level. These usually have a predominance of membership drawn from industry, commerce, or government instrumentalities. Where they have executive functions these in turn range from broad authority over staff, facilities and curriculum to fairly restricted responsibilities in the same areas. An example of a group having complete curriculum authority is the Industrial Training Commission of Victoria. This body approves the content of training programmes in the basic vocational or trade area for the state. Its membership is made up of equal numbers of employer and trade union representatives.

At course levels each of the states and the territories have provision for the inclusion of people representing the client sectors on programme development committees, sometimes in an advisory capacity, sometimes making final decisions.

It is highly likely that the involvement of industry, commerce and government in technical and vocational education will increase very significantly in the immediate future, as these client groups come to fully understand their needs.

Teachers

Nearly two-thirds of teachers of technical and vocational education are engaged on a part-time basis. Although these account for only 30 per cent of the teaching effort in the country they pose special problems, especially with regard to training. As they are employed for the special skills or knowledge they possess, their qualifications—while not always highly academic—are current. These teachers, however, do not always have well-developed teaching skills. All states are concerned with this problem and are engaged, sometimes co-operatively, in developing induction programmes for part-time teachers.

Full-time staff present different problems. The aim is to recruit people with relevant and current experience in industry and commerce, usually over a number of years. This means that potential recruits are older than those in primary and secondary education and have likely established themselves in both careers and family life. Many people in this situation would not consider changing from the known to the unknown, even if they were going to be paid more (which is probably not the case).

Teachers are usually obtained by advertising and interviewing. Successful applicants normally are not teacher-trained so they are given this training in colleges of advanced education while teaching part-time. The entry qualifications as established range across all trade and middle-level vocations.

Once employed, teachers are not required to further upgrade their qualifications, though a large number do. Funds are made available for in-service training and are used to carry out short programmes within institutions, to enable staff to participate in courses or seminars elsewhere and visit industrial or educational establishments.

Guidance services

The importance of counselling students and potential students is recognized, but in Australia most of this burden falls on teachers rather than professional counsellors, as in fact the ratio of counsellors to students is not very good. Consequently that guidance which is provided is mainly directed towards courses, with limited careers advice, and even less personal counselling.

Facilities

It would be hard to find many people in the technical and vocational education system who would say that their facilities were satisfactory. The fact is that they often aren't. Facilities are expensive and, in the case of machinery and other equipment, liable to rapid obsolescence. It may be that the education authorities will need to provide basic facilities of a reasonable standard, and investigate ways of *linking with industry* to make use of *its* facilities.

This raises again the question of where vocational training should be undertaken, and whether it should be the responsibility of the government, the employment sector, or even the individual. From the national point of view it is desirable that governments maintain a significant interest in training, as the employment sector tends to take a much more limited view.

Continuing education

Continuing education is defined as education or training that is undertaken to maintain occupational skills in response to new techniques or knowledge. It may be done intermittently or almost continuously depending on the nature of the occupation, and is directly related to the base qualification both in content and standard.

Programmes are much shorter than those for base qualifications, they may be full-time or part-time, and they are normally concerned with the acquiring of specific skills or techniques. Courses in advanced ceramics and middle-level management are examples.

Financial and cost aspects

Basically funds come from two sources, the Commonwealth government and the state governments. The Commonwealth has seen its main priority as being the upgrading of facilities and consequently contributes about 75 per cent of total funds expended in this area. On the other hand, the states meet nearly 90 per cent of all running costs.

There is quite an imbalance between the funding of universities and colleges of advanced education as against facilities for technical and vocational education. With more than twice the number of students enrolled, the latter get only about 38 per cent of the funds. More funds are being directed to the vocational educational sector but there is no doubt that these will never come near to the level of the other tertiary sectors.

Problems and constraints

Australia's problems and constraints are about people, other resources, and programmes. People are also the biggest asset. Our problems with people are concerned with obtaining the right ones. In a time of rapid technological change this is not easy, especially if contractual arrangements are tied in with other, less demanding, educational sectors. The inability to offer special conditions in special cases to meet emerging needs denies that flexibility so necessary in the current environment. Similarly, the difficulty of maintaining the level of knowledge of teachers already in the system is a cause for concern.

On the other side of the fence there are problems of making people aware of what the system has to offer. The huge variety of courses offered makes it difficult to get across a sense of identity.

Other resources, particularly training facilities in technological areas, are increasingly a problem, due to their expense and their tendency to become rapidly out of date.

The provision of programmes, too, poses problems of a very large order. These have to be relevant to the needs of the community, both as to content and status. So far, technical and vocational education in Australia seems not to have solved these problems or understood the magnitude of resources needed to overcome them. Linking the education system with manpower planning to meet forecast needs for people with specific skills would appear to be a good way of achieving this relevance, but the state of the manpower planning art is not yet such that a great deal of reliance can be placed on it.

Curricula of technical and vocational education

Technical and vocational education in Australia is concerned with preparing people for occupations which do not require studies at a professional level in universities or colleges of advanced education. It is often taken concurrently with employment and seeks to provide initial job qualifications, re-training, upgrading of skills, and personal development. Its impact is by means of educational programmes.

The programmes themselves are designed on the basis of a number of principles common throughout Australia. These are (1) that the courses be job-oriented, though not neglecting broader considerations; (2) that courses be flexible, allowing for changing circumstances; (3) that teaching be as closely related to the job situation as possible, being practical rather than academic; (4) that learning experiences help develop in participants the ability to adapt; and (5) that courses have a sound status in the community. These points will be detailed below.

Programmes are provided chiefly by government organizations. As such they tend to be more formal than others and to be developed from thought-out philosophical bases. The mission of technical and vocational education may be said to be simply *the provision of technical and vocational education as a means of promoting the well-being of the individual and the community.* This basic statement leads to a number of primary aims:

1. To help prepare people to enter or continue in employment in any recognized non-professional occupation.
2. To encourage in people an understanding of the importance of life-long learning and a willingness and ability to undertake further education on a recurrent basis.
3. To help individuals, groups, and organizations develop the capacity to anticipate, cope with, and contribute creatively to social and economic change.
4. To obtain, develop, and use resources efficiently.
5. To promote continuous improvement in the quality of further education.

Curriculum objectives

1. Courses should be job-oriented. The community, in particular the government and employment sectors, see technical and vocational education as being the most relevant of all the educational sectors because it is obviously so closely related to jobs. In turn, the technical and vocational education sector recognizes that it has an obligation to try to meet the community's expectations to the best of its ability. Essentially this means that the sector must identify the requirements of the work-place and translate these into programmes which satisfy those requirements while at the same time providing for the self-development of individuals.

In the past this tended to be done in a fairly subjective manner: a few teachers and a few people from industry getting together and deciding, largely from their own experience, what should be taught. Today, more and more, curriculum developers are attempting to discover and analyse objectively what is actually happening 'out there', and use this information to set up training objectives and tests, sometimes for the whole country.

2. **Courses should be flexible.** It takes quite a long time to investigate and analyse an occupational area and to develop a training programme for it. By the time a course is fully operational, some of it will probably be out of date. To overcome this,courses are made up of a number of units. With changing circumstances new courses can be constructed by combining units from existing courses, or single units can be readily modified or replaced.

This approach also allows for a variety of teaching strategies for all or part of a course, so that full-time or part-time class-room work or external studies are available as options for use according to circumstances.

3. **Teaching should be practical.** Courses do not ignore theoretical considerations, but rather the learning strategies adopted in the colleges try to reflect the practical nature of the occupations for which people are being trained. This means that theory is taught when it is relevant to the practical elements of the programme. It also means that a good deal of the theory taught is tested through practical applications, such as actually building a cupboard, cataloguing a library book, or feeding an infant.

Of course this often poses real difficulties in the provision of appropriate resources, some of which cannot be overcome in the regular technical college environment.

4. **Experiences should facilitate adaptability.** It is no good training someone carefully for an occupation if, when the nature or requirements of that occupation change, the person cannot cope with the new situation. Even on the micro scale, few jobs are so repetitive that an employee can be effectively programmed to do all that is necessary on the job. Programmes, therefore, have to prepare people to adapt to minor changes on the job, and major changes in their occupation or society generally. In other words, programmes should also be concerned with helping people to function effectively in society.

5. **Courses should have status.** This objective arises out of others, and is a pre-condition which must be established for people to be persuaded to participate in programmes. It doesn't mean that people are looking for degrees or diplomas, but they do want to be assured that they are getting something of value, recognized by the employing sector, and immediately useful.

A number of strategies are adopted in Australia to achieve this objective. Perhaps the most important policy is that courses be approved by official bodies, usually a government department or state council. The imprimatur given by such bodies provides the individual with an official recognition of attainment, and the employing authority with evidence of the nature and standard of training received.

Status is also obtained through the involvement of industry, commerce, and government in course development, and when these employing sectors require further study as a condition of employment. Finally, there are public relations activities aimed at highlighting the benefits of technical and vocational education, and the range of courses available.

Occupational areas

It is impractical to attempt to list all the occupations provided for in the Australian technical and vocational education system, and even more so the subjects available. It is even difficult to actually identify discrete courses, as the system allows so much interchange of subjects between courses.

The provision of courses in professional areas is left to universities and colleges of advanced education. The occupational areas in which the education departments have a vital interest are the basic vocational (or trade) other skilled, and middle-level (para-professional) ones.

At the basic vocational level are provided courses catering for apprenticeships and the obtaining of advanced skills in the same general area. This area is concerned mainly with engineering, building, food services, clothing and textiles, and hairdressing.

Middle-level vocations are those which provide support to the operations of professionals although, of course, any para-professional employees work with little or no supervision by professionals. In addition to the broad areas included in the basic vocational area, training for middle-level occupations is provided in many of the applied sciences, art and design, business studies, rural and horticulture, music, para-medical, printing, and the humanities.

It is a general principle throughout the country that courses or subjects should not be offered without there being a demonstrable demand for them. This is easy to say but not so easy to do. It does, however, indicate a serious intent to be relevant to the employment situation. Occasionally subjects and (less often) courses are developed and marketed on the initiative of people within the education system, but these tend to be short and for a particular need in a local geographical area. The resources involved are thus quite limited and any loss through failure of the course to attract clients is minimal.

With courses requiring accreditation by State bodies, increasingly prescriptive demands are made on proponents to ensure, as far as possible, that there *is* a demand for the programme, to assess likely future demand, and to assure that the need is not already being met by other institutions.

The need for courses may be indicated by some form of market survey or by evidence supplied by industrial organizations or associations of people working within particular fields (such as personnel management). This is further confirmed or otherwise when an occupational analysis is undertaken. This gives accurate information on the tasks carried out in any job, the relative importance of these, the frequency with which they are done by individuals, and whether they should be included in the programmes of training institutions or rather be taught on the job.

In the provision of courses there is no discrimination whatsoever between males and females, although some courses naturally seem to attract more of one sex than the other (for example, hairdressing and typewriting for girls, and motor mechanics for boys). There is also no overt discrimination between courses offered in urban as against rural areas; there is however a *de facto* discrimination working against rural areas to some extent in that a full range of programmes is difficult to mount near the homes or employment places of potential students, due to limited numbers and the cost of facilities. We attempt to overcome this by means of external studies programmes, by bringing the students into larger educational centres for 'live-nearby' programmes. In passing, there is also a *de facto* discrimination against urban areas in that rural programmes are not generally available except in rural areas. This means that if people in the city wish to pursue a rural occupation they have to go 'up-country'.

Curricula and productive work

Most of the courses provided in Australian technical and vocational institutions are conducted primarily on a part-time basis; almost invariably the course is in the same field as the job. Therefore the relationship of the curricula to productive work is an extremely close one. In fact it is very difficult to even enrol in a course unless the person is already engaged in employment in the area for which the programme is providing training.

What has not yet been possible is to have the programmes in such form that a person can study a unit at the time he or she is doing the same work on the job. A lot of effort will be needed for this. At present the effort to overcome the problem is by constructing syllabuses in a logical sequence, from basic material to advanced and by providing realistic problems for students to work on in environments as close as possible to the work situation.

Throughout Australia, courses are provided to meet local needs. This takes three forms: (1) where there is insufficient local demand to warrant the provision of a programme, in which case this is provided at one or a few larger centres, usually the capital cities; (2) where there is a peculiar local demand, when a unique course may be provided, such as viticulture or shipbuilding; and (3) where there is a widespread demand, in which case all or part of a course will be provided in a number of centres as near as possible to that demand. Because of the unit structure of courses outlined earlier it is often possible to be able to respond very effectively to quite limited and varying demands.

Evaluation

Evaluation takes two forms—measuring the effectiveness of the learning process occurring within the educational institution, and assessing the quality and relevance of the institution's efforts in the job situation. We can call these two aspects internal and external evaluation.

Internal evaluation is the prime responsibility of the teacher and the teaching institution. It is the teachers' job to devise and use appropriate means for testing their teaching effectiveness. Teachers in this country accept the responsibility and are becoming more skilled in it. The development of better syllabuses by state bodies is helping them considerably.

External evaluation is a much more difficult matter and Australia is only slowly coming to grips with the problem for a number of reasons: there has been little pressure from the employment sector, syllabuses have not been written in objective form, and there are not enough people to actually go out into industry and compare the realities of the job with the training provided in the colleges. All this is changing and no doubt the external evaluation phase will be undertaken more effectively very soon, relying less on opinion surveys and more on actual observation.

Planning and reality

We all know that the event is almost always different to the plan, as it is not possible to forecast or provide for all eventualities. This is certainly true for curriculum planning, especially in Australia where there is no single curriculum plan. What can be said is that there is a consensus on what technical and vocational education is and on the principles underlying it. There is also emerging a consensus with regard to *strategies* for curriculum development. This consensus is that programmes should be closely related to the needs of occupations and that these needs should be determined as objectively as is possible.

Difficulties in achieving complete agreement, and carrying out such agreement, arise partly because of the great distances between the decision centres (more than 3,000 kilometres in some cases) and the time needed to develop ideas, and the costs of liaison. They are also caused partly by the lack of resources available for the planning phase, as opposed to the implementation phase. On the whole, nevertheless, the implementation of curriculum plans is proceeding reasonably well.

Innovations and experiments

Curriculum innovations are one of the chief rejuvenating features of any education system, offering the chance of better education for the students and more job satisfaction for the innovative sector of the teaching force.

The very nature of technical and vocational education calls for innovation. We are constantly being asked to develop our programmes or to revise old ones, and, as the community comes to expect better programmes from us, we have to spend more time trying out new teaching methods or curriculum development models or evaluation techniques. Circumstances force us to innovate and experiment.[1]

We are also becoming more professional in our approach to innovation. Either formally or informally a number of principles are being followed, including that:

1. Proposed innovations should take cognizance of existing policy and resources;
2. Innovations should be planned within the context of other activities (current and planned) in related areas;
3. Innovators should be aware of what is happening in other states;
4. Innovations should be carefully planned;
5. Innovations should reflect an awareness of the current state of knowledge regarding the process—and the probable effects outside the area of innovation;
6. Opportunity should be provided for interested parties to comment on proposed innovations before they are allowed to proceed;
7. Pilot programmes should precede widespread implementation; and
8. Means for evaluating the effectiveness of the innovation are prescribed at the outset.

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[1] There is no doubt that innovation should be encouraged. In fact it is inevitable, but at the same time innovators need to be aware of the possible consequences of their actions, both with regard to the effects the innovation may have on the students, and the implications to the whole social system [and to the environment] that are inherent in the change. In this latter respect educators have a responsibility to society to raise the community's consciousness as to the possibilities and problems of significant innovations which are occurring *outside* the education system, such as the introduction of the micro-processor. Many Western societies are throwing up their hands in horror at prospects of massive unemployment: few of us are coming up with solutions to the problem. Shouldn't *we* be making a contribution?

In their 1977 report on the field of transition from school to work or further study, the O.E.C.D. examiners said that Australia was, in many ways, one vast area of experimentation. There is no doubt that this is true and the challenge is an enormously stimulating one. The only trouble is that most people seem to be too modest about what they are doing, with the result that innovations and experiments are not widely known outside the state system or even the college involved. Here in outline are a few of the interesting activities that are occurring in various parts of Australia.

On-farm training in South Australia. Traditionally, practising farmers in South Australia trained on the job in an unstructured manner. This practice is now no longer efficient enough to be economically viable. The possibility of farmers becoming full-time students for one or more years is not an option in many farm situations.

What was required was an educational programme which related to local conditions and the presentation of which fitted in with local seasonal conditions and farming activities, mainly sheep farming. The programme was developed by lecturers and specialist curriculum officers, by farmers, by farmer organizations, by rural service companies and specialists in agriculture employed by the government.

The aim of the course was to equip farmers and potential farmers with the knowledge and skills in farm (business) management, animal husbandry and associated technical skills to enable them to farm efficiently and profitably. All sections have three components: (1) theoretical, (2) work experience, and (3) simulation. The 18-month course was designed to include 15 months on the farm and three months away on block release. The four block releases (each of three weeks' duration) were run during periods of low farming activity and held at educational institutions where specialized facilities and lecturers were available.

A full-time educational co-ordinator oversaw the project which was managed by a Course Committee drawn from the various rural-interest groups. Each student required a farm on which to work and a personal supervisor, usually the farm owner and often the student's father, who was the Master Farmer. The latter was trained in a two-day course to supervise and evaluate the student's work.

The programme has met the manpower training needs of the local farming industry in a way that does not disrupt the industry but uses it as a resource. The course design and content can be adapted to meet different needs dependent upon local conditions and needs.

Mobile instruction in New South Wales. New South Wales is our most populous and industrialized state. It also generates considerable wealth from mining and farming. Although most of the population is concentrated on the coast in the vicinity of Sydney many people needing further education are scattered throughout the state over a very wide area. The New South Wales technical and further education authorities have responded imaginatively to this situation by providing a number of mobile instructional units of two types, rail-based and road-based.

The rail-based units are railway carriages equipped for use as workshops and training schools. The New South Wales Department of Technical and Further Education, in co-operation with the N.S.W. Public Transport Commission, operates three such units. Each travels on a circuit of country areas and extends technical education facilities to students who are unable to attend technical colleges. Two of the units are equipped with lathes, milling, shaping, drilling and grinding machines, farm machinery, automotive testing equipment, electrical and oxy-acetylene welding equipment, fitting and sheet-metal work benches, 16mm sound projector, slide and strip film projector, kerosene engine and hand tools. The third unit consists of an electrical trades laboratory, workshop, wiring section, and drawing and lecture room.

The units provide instruction for apprentices, tradesmen undertaking post-trade courses, students enrolled with the College of External Studies who need supplementary practical tuition, and students of the subject Farm Mechanics and courses in Welding.

Two mobile road units in the form of specially equipped caravans provide instruction in shearing-shed techniques at country centres where permanent facilities for such instruction do not exist. The units stay at each centre for a period of 12 months.

Small businesses in Tasmania. It is probably appropriate for the smallest state to be involved in helping small businesses. It is also appropriate because small businesses make up the majority of business enterprises in Australia, are significant employers, and have the least access to professional advice and assistance.

Since the beginning of 1979 the Division of Further Education in the Tasmanian Education Department has operated two-day seminars for operators of small businesses. These have been developed in co-operation with the Tasmanian Training Council and the Department of Economic Planning and Development. Seminars have concentrated on specific issues, such as operating strategies, finance and budgeting, and taxation. Such topics are presented in the context of the clients' operations, for example with an emphasis on rural businesses. They may also be provided away from the normal college environment—a recent seminar was conducted on an island between Tasmania and mainland Australia.

Programmes such as these indicate that the technical and vocational education system is conscious of the need to be flexible and relevant in its response to community needs.

Curriculum development in Victoria. Victoria has adopted an Instructional Systems Model for developing curricula. This model has been used for some time by the armed services, in Australia and other countries, and by the vocational education systems in a number of other countries, notably Canada and the United States. This curriculum model offers the promise of better training programmes, which are objectively designed and demonstrably relevant to the needs of the clients.

Numerically controlled machine tool instruction in Western Australia. Since 1973 the Technical Education Division of the West Australian Education Department has monitored developments in the engineering manufacturing industry and by 1976 had noted that local industry had installed a significant number of numerical computer-controlled machine tool units. In response to the projected need to train manual part-programming and machine-operator staff, a programme was developed and in late 1977 a 4-Axis Matsuura Machining Centre was installed and commissioned in the Wembley Technical College. A priority for access to training in manual part-programming courses was given to adult representatives of the local engineering industry. The fitting and machining apprenticeship course has also been revised to include essential elements of numerically-controlled programming and all senior apprentices from other colleges are time-tabled to use the Wembley facilities.

During 1979 a Digital Equipment Corporation PDP 11/40 computer was installed on site at the Wembley College. This made it possible to offer courses in computer-assisted programming in late 1979. Subsequently the system has again been expanded and an 18-inch graphics terminal driven by a second on-site computer at (PDP 11/34) has been installed. It is proposed in 1980 to tie in the numerically-controlled machinery centre with the on-site computer and to offer programming courses involving graphics terminal applications.

Conclusion

There are enormous tasks in the years ahead, with accelerating technological and societal changes creating new expectations and placing increasing burdens on all to deliver first-class education. Environmental considerations will call for imaginative technology and ways to learn it. It is a challenging responsibility.

Lake Jillamatong is an excellent site for intensive and integrated field study in environmental education

A group of students observes river terrace formation during field study in agriculture and the environment

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BANGLADESH

by Rafique Haque

The education background

Bangladesh, a land area of about 56,000 square miles, is bounded on three sides by India and by the Bay of Bengal to the south. For a short length in the south-east it has a common boundary with Burma. The country has a very large population of more than 81 million in this small area and the growth rate also is rather high. The literacy rate on the other hand is low, with about 30 per cent for males and 15 per cent for females.

Bangladesh is the former eastern province of Pakistan, having emerged as an independent country in 1971. In the field of education Pakistan inherited what British India had in 1947. After initial setbacks some development took place in the area of technical and vocational education and it found a somewhat respectable place in the educational horizon. The decade of development, 1960-70, had an impact on Pakistan, and the country embarked upon large-scale industrialization and a host of other nation-building activities, and technical education received a dividend from it. In physical terms two specialized universities were founded—one each in the fields of agriculture and engineering. Also established were 17 polytechnic institutes and six monotechnic institutes offering intermediate technical education in engineering, commerce and other fields, together with about 30 vocational training institutes and technical training centres offering Trade Certificate courses.

The education system evolved could be summarized as a (5) + (3+2+2) + (3/2 + 1/2) school years of work for the highest degree. In short, five years of primary education starting at about the age of 6^+ is followed by seven years of secondary education in three breaks—three-years junior-secondary, two-years secondary and two-years of higher-secondary stages. University education is of four years' duration. The first degree is of two years' work which for honours is of three years' duration. The Master's degree is of one or two years' work depending on the first degree.

In the above system the first public examination is held after the tenth school year leading to a Secondary School Certificate (SSC). Diversification is allowed in the beginning of the ninth year and a student may select any of Science, Humanities, Commerce, Industrial Arts, Agriculture or Home Economics depending on what the school has to offer. The SSC is the pre-requisite for entry into Intermediate Colleges for general education and in a large variety of technical institutions, and also for some selected vocational courses in Vocational Training Institutes (VTIs) and Technical Training Centres (TTCs).

After the twelfth schooling year the Higher Secondary Certificate (HSC) examinations are held by the same examining Boards, namely the Boards of Intermediate and Secondary Education (BISE) almost in the same branches of SSC. The science courses at this stage are, however, diversified into pre-engineering, pre-medical, agricultural, industrial arts and general science.

Organization of technical and vocational education

Technical education is organized in three tiers; courses awarding certificates, diplomas and degrees. The certificate courses, in general, are for training skilled workers and are of one or two years' duration offered in Vocational Training Institutes (VTI) under the Directorate of Technical Education (DTE) of the Ministry of Education and the Technical Training Centres (TTC) under the Bureau of Manpower Employment and Training of the Ministry of Labour and Social Welfare. Minimum entry requirement for these courses is eight years of schooling, but in general the students of these institutions are secondary-school certificate holders or school leavers of that stage.

Post-high-school technician education is offered in Polytechnic and Monotechnic Institutes. In the 17 Polytechnics, located one in each district, are offered three-year courses in engineering technologies leading to a diploma. There are 13 branches of specialization of which civil, electrical, mechanical and power technologies cover about 90 per cent of the total student population. In the same institutes are also offered two-year diploma courses in Commerce having three specialized branches. The two-year Trade Certificate Courses offered in VTIs and TTCs are also offered in the Polytechnics identified as second-shift trade programmes. Monotechnic Institutes offer courses in Commerce, Ceramics, Textiles, Marine Diesel, Printing and Leather fields of different durations leading to a certificate or diploma. The Textile and Leather Institutes have been promoted to being Colleges and affiliated to Dacca University for granting degrees in the respective fields.

The Bangladesh Technical Education Board (BTEB) affiliates the institutions offering Trade Certificates and Diploma Courses. The Institutions are set and administered by the Government and there is no private

participation worth mentioning in this field. Undergraduate programmes in engineering are offered in the three Engineering Colleges and at the Engineering University. It is four years' work after high school leading to the B.Sc. (Engg.) degree. Post-graduate work in engineering fields can be pursued only at the Engineering University.

One thing to be taken note of is that general education in the pattern described above forms a continuous process from the primary school to the University with stages, diversifications and methods of transfer. Technical education, on the other hand, comprises new channels at three stages of general education—but between these there are no links for vertical mobility. In fact, two tiers of technical education—the trade and the technician programmes—form almost blind paths. Only recently, in 1978, a decision was taken by the government to introduce a three-year degree programme for the Diploma Engineering graduates of Polytechnics so that capable students of this course seeking higher education can obtain a degree in engineering through this stream as well. Implementation of the proposed courses is only beginning and hence its practicality is yet to be seen.

Admission capacity, dropouts and output

Enrolment capacity in the trade certificate courses, the VTIs, TTCs, and the second shift of Polytechnics combined, is about 3,500. According to a study by the National Foundation for Research on Human Resource Development carried out in 1979, about 29 per cent of the total seats in VTIs and about 20 per cent of seats of TTCs remained unfilled that year.

The dropout rates in these institutions are also rather high. The popular trades are Farm Mechanics, Electricians, Machinists, Automechanics and General Mechanics. Some trades, like Welding and Air-conditioning, are gaining popularity while formerly essential trades like Blacksmithy have become extinct and Wood-working is giving way. As for output and utilization of these institutions, the picture is rather gloomy and other then in one or two places the intake capacity and output are distressingly low.

The above situation in respect of trade programmes is possibly due, apart from other reasons, to the outlook and values attached to such jobs by society in general and the potential employees in particular. There is, however, a changing trend and over the past few years there is an increasing admission rush in most of these institutions, and secondary school certificate holders in larger numbers are entering these courses. There is also a significant influence of the recent opening of job opportunities in countries of the Middle East.

In terms of demand, the Polytechnic courses of Diploma in Commerce and Diploma in Engineering are in a much better position than not only trade courses but the parallel courses in other technical institutions and intermediate classes of general education. Even with relatively stiffer entry requirements for every position of Diploma in Engineering there are from five to ten applicants depending on the location of the institute. Due to tradition and the present phase of development in the country, Civil Engineering has the highest demand and as such the largest number of seats.

In 17 Polytechnics combined there exist about 4,000 seats in first year. There are at present 12 specialized branches, diversification taking place in the beginning of second year. Drop-out rate in the Diploma Engineering course is comparatively lower and the over-all percentage of pass in the final examination is higher than that of trade courses—although, speaking in terms of output against intake capacity, performance of this programme also cannot be said to be satisfactory.

For Diploma in Commerce there exists a total of about 1,500 places in first year. Diversification in this course starts from the beginning and there are three specialized branches. Demand for this course is also quite high and, in addition to job opportunities at the end of the two-year course it has the attraction of recognition for transfer to relevant undergraduate courses at the University.

Polytechnic graduates of either diploma course are not facing serious unemployment problems. In certain specialized branches there seems rather to be a short supply as indicated by employers' inquiries and by the frequent changing of jobs by some capable young people in the first few years of their service career.

Staff positions and other facilities

Staffing patterns and teacher strength of the Polytechnics is quite satisfactory but a handicap remains in the recruitment procedure–which is centralized–and in the inter-institute transfer of teachers and other staff members. This does not encourage individual institutes to evolve their own staff development policies, nor do the teachers seem to inculcate the required seriousness in the development of workshops, laboratories and the departmental teacher training with common curricula and syllabuses. Centralized government control on finance, staff and other matters–and centrally set and administered examinations–have contributed to a national uniformity but the present level of achievement is still below expectations, and much remains to be done.

One great handicap now being faced in the field of technical and vocational education in Bangladesh is the lack of textual and reference reading materials. The medium of instruction at the second level is Bangla, the mother tongue. English is taught as a second language at schools but the standard attained is not quite enough for the students to follow technical books of the college level with efficiency. Also, due to the high cost of production of technical books, and the limited market, the production of such materials in the local language has not gained momentum–although there have been some unconcerted efforts.

Workshop and laboratory facilities in the Polytechnics and other institutions on an average are passable. But maintenance and upkeep present a great problem. Equipment has been procured from different countries under different programmes, and obtaining their spare parts and supplies has always been difficult.

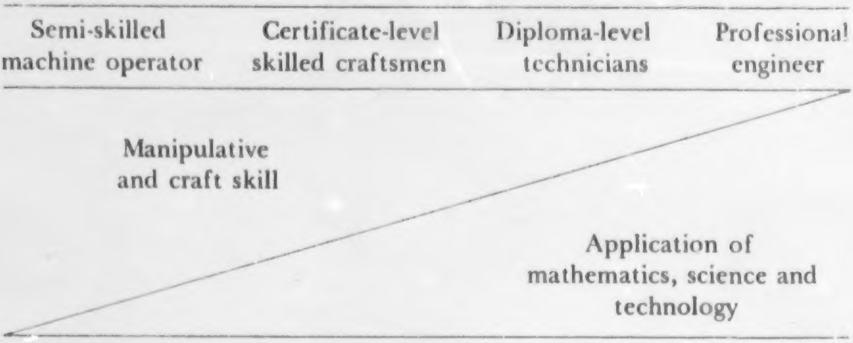
Engineering education

Technician education had its beginning virtually in the middle 1950s with the setting up of the first Polytechnics. The 1958 Education Commission of Pakistan classified the spectrum of work and manpower in the engineering field into four categories. At the first level are the unskilled and semi-skilled workers who exercise manual dexterity and require very little formal education but rather some work experience. In the second category are the trained operators in factory and office whose industrial and commercial skills are directly oriented to the needs of the jobs they are to perform. In the third category are the technicians, who generally constitute the supervisory personnel in industry or office, whose practical skills enable them to appreciate the problems of the skilled worker and whose theoretical preparation enables them to understand the ideas of the engineer or the executive and to interpret them to the skilled worker. At the top of the pyramid is the fourth category, the creative engineer and executive, capable of developing techniques, methods and designs, sensitive to needs and local conditions but well versed in world knowledge and experience.

From the above starting point the commission defined an engineering technician as one who possesses:

a) Skill in certain industrial processes;
b) An understanding of the principles underlying these processes and this skill;
c) An experience in supervising the industrial worker in a competitive field in which efficiency is essential. It is the possession of the last two qualities which differentiates technicians from operators of machines as it permits them to understand the intentions of engineers and executive staff and interpret these to the skilled and semi-skilled workers. Courses at this level and the recruitments of staff to teach them should therefore be guided by these objectives.

Based on a definition by the American Society for Engineering Education, suitable ratios of manipulative and craft skills to the application of science and technology were accepted to be as represented in the diagram below. This guided the design of the syllabus for the respective courses.


Semi-skilled machine operator
Certificate-level skilled craftsmen
Diploma-level technicians
Professional engineer
Manipulative and craft skill
Application of mathematics, science and technology

Curriculum for Diploma in Engineering. The objectives of the Polytechnic Diploma Courses are three-fold. First in order has been placed "skill in certain industrial processes." Based on this, practical courses have been introduced from the beginning, starting with courses like wood-working and basic metal-working. Since most of those who join these courses come from villages, and the secondary school system is such that they are not made acquainted with the basic hand tools, the workshop courses are designed to make up these deficiencies. The introductory shop courses and the science and technical subjects covered in the first year form the foundation for the advanced technical, laboratory and workshop courses which are offered in the latter period in order of increasing difficulty.

Second in the list of objectives is an understanding of the principles underlying these processes and the skills involved in them. Toward this end are set up the courses on science and mathematics, together with the technical courses in a chosen branch supplemented by courses of other technical disciplines which are deemed to be complementary and supportive to the specialized technical courses.

The third objective has been defined as "training in the supervision of industrial workers." This leads to courses on management, inventory and record-keeping, accounting, communication and report writing, social guidance and human relations, safety practices, labour laws and others.

Diploma in Commerce courses. The Diploma in Commerce programme is of two years' duration and diversification starts from the first day. There are three branches of specialization: Accounting, Secretarial course–Bangla medium, and Secretarial course–English medium. The specialized courses of the three branches are set up with a core of common courses in language, office management, rudimentary knowledge of economics and typewriting.

The courses in this programme are also offered on a semester basis, and the first three semesters are controlled by the respective institutes. The process of Board final examination for the award of diploma, however, differs with that of diploma in engineering. In this case there is one examination only, held on completion of four semesters in the subjects taught over the extra period. Examinations in this case also are externally set and externally assessed.

The diploma in commerce programme has again two objectives. The major objective is employability in the respective fields. Diploma holders in the accounting group find employment in banks, insurance companies, accounting and auditing firms and other government and non-government financial institutions. Both groups of secretarial diploma holders find jobs in public and private organizations suited to their newly acquired skill in shorthand and typing. Since in Bangladesh the language for official communication has been accepted to be Bangla, the national language, there is increasing demand for Bangla-speaking people but in the business field and for all external communication English has its own place.

The second objective of this course is to provide transfer opportunity to under-graduate courses for university education. This on the one hand caters for the meritorious, capable students and, on the other hand, those who cannot find a suitable job at this stage may also take advantage of continued education.

Trade Certificate course. Initially the trade courses were conceived as an opening for those school teachers who are not suited to academic study. Courses were designed to impart training in certain skills with necessary reinforcement of allied knowledge of simple calculations, sketching and blue-print reading, safety practices, language and beginner's skill in wood-work, basic metal-work and electricity. It was expected that the skill gained will make them employable in the relevant industries as the operators. Naturally the courses have been made with high emphasis on practical work. On an average the ratio of practical to theoretical work is about 65:35.

Major activities in the engineering education field in this country fall in the three areas of civil, electrical and mechanical. Civil engineering traditionally is the oldest and, depending on necessity, courses are organized to meet the needs in the construction of roads, bridges and buildings, raising dams or digging canals, handling of rivers and ports and such other activity.

In the next lower level—that is, for technician training—the basic engineering fields identified above have been split into smaller fields. For example, mechanical engineering has been divided into mechanical-production technology and power technology. Power technology again has in itself three identified areas: automobile, refrigeration and air-conditioning, and power plants. The specialized courses available at present are Architecture, Civil, Electrical, Mechanical, Power plants, Power-automobile, refrigeration and air-conditioning, Electronics, Chemical, Farm, Industrial wood, Machine shop and Electrical installation and maintenance.

For teaching and training in craft skills the area is further sub-divided and narrowed down. Jobs for which formal training is now available in one or more institutes are auto-mechanic, electrician, machinist, air-conditioning mechanic, radio mechanic, welder, foundry and forging smith, wood-worker, pattern maker, mechanical and building draftsman, general mechanic, marine diesel mechanic, marine diesel operator, ship-wright plate maker and farm mechanic. New trades are introduced when such needs arise, and training is sought when the facilities permit.

Innovations and experiments

Multipurpose use of some institutions. In the technical education field of Bangladesh when the Polytechnic Institutes were first established they were intended for the teaching of technician courses, awarding only a

Diploma in Engineering on successful completion of a three-year post-high-school course in some engineering technology. Later, the commercial education programme and the trade courses were introduced, and this increased the utilization of facilities. Now most of the institutions operate from 08:00 to 20:00 hours daily.

Again in three large institutes the formal two-year trade course was not added. In the oldest Polytechnic at Dacca before this formal trade course came into being, an experiment on short-term trade courses of various natures was carried out on a self-supporting basis. These short courses were meant for young people already on the job, having some training on the shop floor on a 'learn-while-you-earn' basis. Naturally there existed and still exist many repair and maintenance shops, and small manufacturing shops which keep the society going, and some people are receiving some training simply based on the business cycle of these small enterprises.

The short courses were intended to harness the experience gained in these workshops and add to it the required amount of additional know-how in the institutes and class-room situations for improvement of skill and efficiency. These courses have been very well accepted by both trainees and employers. Based on this line, short courses have been introduced in Polytechnics situated in large cities and industrial towns where the potential exists for such informal training of the people on the job and a sufficient number of such people seeking training are available who are ready to pay for their training expenses. For these courses one has to pay from 10 to 25 times more than formal programmes, yet the admission demand is high. Since the courses are short and intensive it is much easier to keep the attention of the trainees and they are also, as the experiences reflect, eager to get their money's return. Beyond doubt the morale of these trainees is quite high.

In some Polytechnics again short courses were tried based upon customers' need. Large employers—when they first recruit in large numbers and prepare for entering into operation—or those undergoing a major change due to the introduction of new equipment, a new project or some other reason find it necessary to give further training to their people. In such instances Polytechnics have been rendering remarkably good service and tailor-made programmes have been offered in many institutes to cater for a wide variety of customers' requirements.

Industrial training for students. Until recently the academic programmes of the Polytechnics were restricted to within their four walls, supplemented by occasional study trips to industries—organized usually to break the monotony of campus life. These study tours are of the whirlwind type and the participants do not have much scope to synthesize the experiences of the exposures into some working capacity.

Since 1975, attempts have been made to work out the academic schedules of the Polytechnics in such a way that there is one long vacation of from eight to twelve weeks per year. This vacation is placed in such a way that the second-year students finish their promotion examination. During this gap they are now placed in industries for from six to ten weeks to join the work force in the capacity in which they would expect employment and downward to unskilled manual work. The work thus ranges from very challenging mental exercise to hard manual labour.

After some initial difficulty this programme has now become acceptable to the industries, and their participation has increased satisfactorily. By now most of them are granting training allowances and other benefits to the trainees for the period they stay with the industry. Extension of these training facilities has almost been accepted as an investment. In future it may be possible to incorporate such training to be mandatory as part of the requirement for the award of a Diploma. On the other side, industries may be grouped to finance such training programmes and allow their premises and facilities to be utilized compulsorily for training. This would however need legislation in some form and in future the whole programme might take shape in the pattern of the Industrial Training Boards of Britain.

Industrial training for teachers. One weakness in the field of technical education in Bangladesh has been the lack of adequate industrial training of the teachers. Towards this end teachers, like students, are sent into selected industries to undergo short but intensive training. In the teacher training activity of the whole country the Institute for the Advancement of Science and Technology Teaching (IASTT) of Dacca University had formerly taken a vital role. This Institute had been organizing summer training programmes of from four to twelve weeks for groups of teachers. The programmes were run in different Polytechnics for different subjects. This programme of College-based subject training has now been dropped in favour of industrial training.

The present programme is such that from every Polytechnic each year some teachers are selected by the respective principals and heads of department, who also decide the period and field of training. Placements are located near the parent institute, wherever possible. This entails less dislocation of the trainees from their work station, and supervision by the Principals becomes easy. Again the teachers practise their training experience in the following session in class while teaching the students. There have been occasions of paying a second visit together to the same place. This, no doubt, strengthens class-room teaching.

The IASTT finances the whole programme. Some industries are, however, showing interest in it as well and, like the students' programme, it may not be too difficult to get industries to finance at least part of the industrial training programme for teachers. It has also been possible to work out the individual programmes of teachers to see the current practice of the same kind at different places and have a comparative view—or to stay for a shorter period in a number of places and obtain information and training in a variety of topics within the main field of interest. These training programmes are already bringing good returns. Apart from the personal improvement of the teachers and a gain in knowledge, the relationship with the local industries has been improving, and they now seem to take greater interest in the activity of the Polytechnics. If properly handled it is expected that the programmes will turn into a healthy exchange for mutual benefit.

Guest lecturer programme. In order to supplement the teaching of the regular teachers, people engaged in technical and professional work are brought in. The schedules are worked out well in advance, specific topics are decided in consultation with the guest speaker and in conformity with the needs of the syllabus. This brings current practical problems into the class-room discussion. It becomes possible for the teachers to identify some of the shortcomings in their own teaching on a comparative basis. Directly and indirectly the expectations of the possible employers are also revealed. On the other hand, the prospective employers of the diploma holders develop a positive sense about the syllabus and with their own involvement in teaching can decide how much to expect from them. As for the students, not only do they increase their knowledge; they also get acquainted with practising engineers and executives which may help them in the selection of their first job.

Pre-employment training for technicians and craftsmen. The Polytechnic diploma holders in engineering and commerce and trade certificate holders now have an opportunity of undergoing specialized training to supplement their knowledge gained in their regular academic programme as pre-employment training. These are short training courses in narrowed fields organized by Polytechnics having two components: institute-based and related-industry-based. The Bureau of Manpower, Employment and Training (BMET) finances these programmes. It is expected that this would increase first their employability and then efficiency in their first job. With the opening of job opportunities in the Middle East, this pre-employment training is very significant, and young people are taking it with seriousness.

Self-employment of qualified craftsmen. Through the Bureau of Manpower, Employment and Training, the government has taken up a scheme to induce qualified craftsmen into self-employment. Under this scheme, people having certificates in trades like carpentry, auto-mechanics, electrical work and plumbing will be selected through practical testing and interview. Those selected will be given on credit a set of tools required for their individual trades. Additionally they may take for starting off a small capital at nominal interest. After they are on the job, work will be assessed annually and the first repayment is expected after two years. It is expected that this programme will alleviate the needs of the local community and improve the local skills.

Bulletin of the Unesco Regional Office
for Education in Asia and Oceania
Number 21, June 1980

BURMA

by U Khin Maung

Introduction

The Socialist Republic of the Union of Burma is mainly an agricultural country, with about 66 per cent of the total economically active population belonging to the agricultural sector. With the country's population increasing, it is becoming more and more important that agriculture, which is the main basis of the national economy, be modernized and that other resources and capabilities be fully developed. The successful implementation of plans for the development of the country's resources depends on the quantity and quality of technicians and skilled craftsmen available which, in turn, depend on the availability and standards of the schools, institutes or training centres which could produce the manpower required by the country.

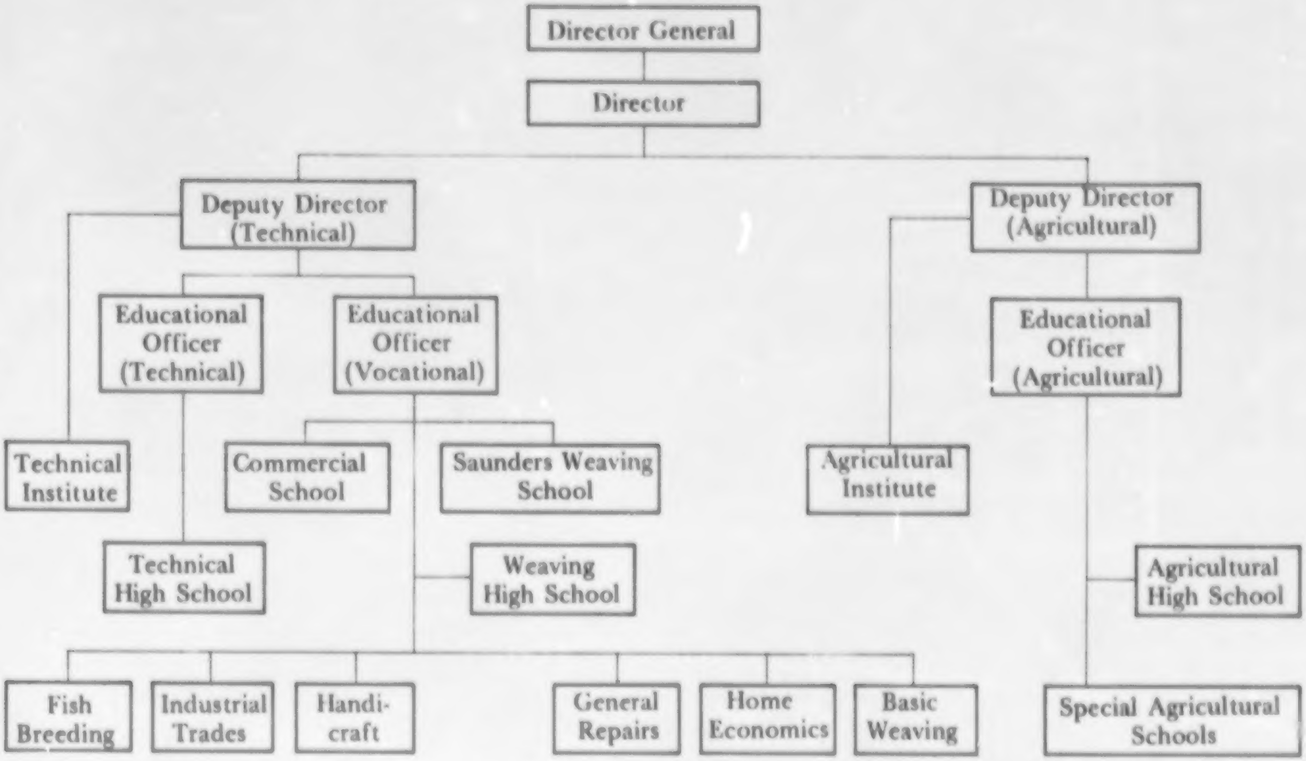
A new education policy was therefore declared and the old education system replaced by a new one in which technical, agricultural and vocational training was to play an important role. The Ministry of Education hence established six departments for the management of all educational activities of the country. These are: (1) Department of Basic Education; (2) Department of Higher Education; (3) Department of Technical, Agricultural and Vocational Education; (4) Educational Research Bureau; (5) Examination Board; and (6) Burmese Language Commission.

The structural pattern of the Basic Education System is 5:4:2, a total of 11 years with five years in the primary stage, four years in the middle stage and two years in the high or secondary stage. Three points may be identified where courses are diversified in an attempt to divert pupils from the single track leading to university education and to produce the skilled and technical manpower that is urgently needed in this country: (1) end of primary stage; (2) end of middle stage; and (3) end of high or secondary stage.

Table 1. Number of schools/institutes, teaching staff and students of the three departments under the Ministry of Education (1978 figures)

	Schools/ institutes	Teaching staff	Students
Dept. of Basic Education			
1. Primary	20,499	76,253	3,710,613
2. Middle	1,222	17,819	722,434
3. High	576	10,479	163,820
4. Others	16	395	5,225
Dept. of Technical, Agricultural and Vocational Ed.			
1. Technical	13	426	5,379
2. Agricultural	17	113	1,022
3. Vocational	21	120	1,660
4. Trades/Technical Evening Courses	8	120	2,086
Dept. of Higher Education			
1. Universities and Colleges	34	3,353	98,166
Total	22,406	109,078	4,710,405

Chart 1. Organization of the Department of Technical, Agricultural and Vocational Education


Director General
Director
Deputy Director (Technical)
Deputy Director (Agricultural)
Educational Officer (Technical)
Educational Officer (Vocational)
Educational Officer (Agricultural)
Technical Institute
Commercial School
Saunders Weaving School
Agricultural Institute
Technical High School
Weaving High School
Agricultural High School
Fish Breeding
Industrial Trades
Handicraft
General Repairs
Home Economics
Basic Weaving
Special Agricultural Schools

Technical, Agricultural and Vocational Education

The main objectives of Technical, Agricultural and Vocational Education are to:

1. Cultivate technicians and skilled craftsmen essential to the establishment of industries;
2. Produce technicians and skilled craftsmen who will widely apply modern techniques for the development of the agricultural sector of the country.
3. Expand as necessary vocational education in harmony with the political, economical and social system of the country.
4. Draw up and implement plans for the cultivation of technicians and skilled craftsmen replete with socialist attitudes and beliefs.

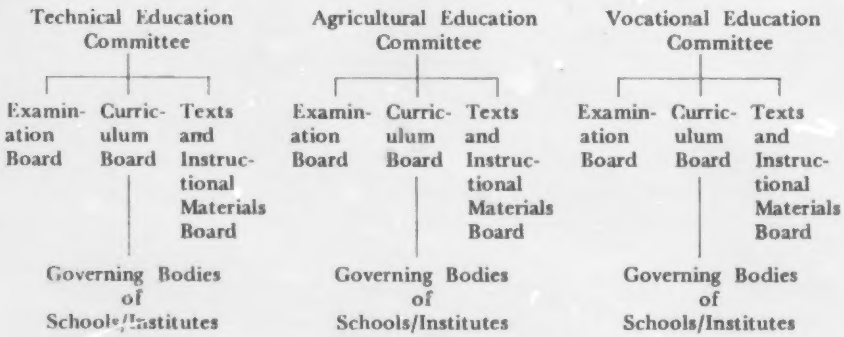
The Ministry of Education has constituted a Technical, Agricultural and Vocational Education Council for providing specific guidelines for the implementation of the main objectives. The Council is composed of the Minister of Education as chairman, Deputy Minister of Education as Vice-Chairman, Director of the Department of Technical, Agricultural and Vocational Education as secretary, and Directors-General, Rectors and representatives of various departments and corporations as members.

Functions of the Technical, Agricultural and Vocational Education Council

1. To set guidelines for the Department of Technical, Agricultural and Vocational Education in developing technical, agricultural and vocational education which is in harmony with the economic plans of the country and appropriate for building and safeguarding the Burmese Socialist society.
2. Submit recommendations for the expansion of technical, agricultural and vocational schools and institutes to the Ministry of Education.
3. Supervise and manage matters of curriculum, texts, classes, as are commensurate with the political, economical and social conditions of the country.
4. Submit recommendations to the Ministry of Education for establishing appropriate vocational schools at the appropriate levels for those who are unable to continue their basic education.
5. Submit recommendations to the Ministry of Education for the establishment of courses for the cultivation and development of teaching staff.

6. To form, as required, Educational Committees, Governing Bodies of Schools/Institutes, Examination Boards, Curriculum Boards, Texts and Instructional Materials Boards for the technical, agricultural and vocational schools and institutes.
7. Lay down duties and responsibilities of members of the various Boards, Committees and Governing Bodies set up by the Council.

The Council is divided into committees to function as follows:



Technical Education Committee
Examination Board
Curriculum Board
Texts and Instructional Materials Board
Governing Bodies of Schools/Institutes
Agricultural Education Committee
Examination Board
Curriculum Board
Texts and Instructional Materials Board
Governing Bodies of Schools/Institutes
Vocational Education Committee
Examination Board
Curriculum Board
Texts and Instructional Materials Board
Governing Bodies of Schools/Institutes

Schools and Institutes under the Department of Technical, Agricultural and Vocational Education (DTAVE)

Level	Establishment	Number
Post-secondary	Technical Institutes	5
	Agricultural Institutes	2
	Commercial Schools	3
	Saunders Weaving School	1
Post-middle	Technical High Schools	8
	Agricultural High Schools	13
	Weaving High Schools	7
Post-primary	Industrial Trades School	1
	Handicraft School	1
	Domestic Science School	1
	General Repairs School	6
	Basic Weaving Schools	2
	Special Agricultural Schools	

Other non-formal classes opened at the schools and institutes for people who have entered the world of work are: (1) Engineering Technology Evening Classes 2, (2) Evening Technical Institute 1, and (3) Evening Trade Courses 5.

Financing and facilities of technical, agricultural and vocational education

Schools and institutes under the DTAVE are managed and financed by the Government; students are offered free education in all of them. All funds are channelled through the Ministry of Education. About 60 per cent of the student body attending institutes at the post-secondary level receive stipends of Ks. 60 per month. Technical high school students receive Ks. 50 per month whereas students of Agricultural high schools are offered free room and board. Students in vocational schools are awarded stipends ranging from Ks. 25 to Ks. 40 per month.*

Annual government budgets allotted to technical education have been increasing with the expansion of schools and institutes under the DTAVE. This, supplemented by assistance in the form of equipment acquired through international organizations such as the Colombo Plan (United Kingdom, New Zealand, Australia) has helped in building up workshops and laboratories in the schools and institutes. Japan has also provided equipment for eight technical high schools. Yet, there is place for improvement in that, although the schools and institutes are equipped with a variety of equipment required for each training programme, the number of students working at a machine in some of the workshops may be found to be too large for effective training.

Increased use of the workshop facilities and equipment of the schools and institutes is made by offering a number of non-formal programmes for continuing education: engineering technology evening classes, evening classes for engineering diplomas, and evening trade courses. These programmes are offered to those who were unable to go on with their studies and were forced to find employment at an early stage.

Teaching staff

Teaching staff of Technical, Agricultural and Vocational Schools and Institutes may be classified as:

1. Lecturers – Baccalaureates with a minimum of five years' field experience
2. Assistant Lecturers – Baccalaureates without field experience or associates of Government Technical Institutes with a minimum of ten years' teaching experience
3. Instructors – Associates of Government Technical Institutes with a minimum of three years' teaching/field experience

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* Approximately 6.72 Kyats (Ks.) = 1 US dollar.

4. Assistant Instructors – Associates of Government Technical Institutes
5. Demonstrators – Skilled tradesmen for workshops and graduates for science laboratories

Prior to 1972, most of the staff were sent to countries such as New Zealand, the United Kingdom and the United States of America for technical teacher training. In-service (evening) teacher training courses were also conducted by advisors working for the DTAVE. In 1972 the Department set up a Technical Teacher Training Unit at one of its Technical Institutes. The Unit offers one-year pre-service training courses for Associates of Government Technical Institutes and short in-service training courses for staff of all schools and institutes under the DTAVE. Staff members of schools and institutes are also sent abroad to attend special training programmes arranged and financed by the Government and international organizations.

Curricula for technical and vocational education

The importance placed on the modernization of agriculture and on industrialization as a means of quickening the pace of economic development made it necessary that technical, agricultural and vocational education programmes be further expanded and the curricula put on a more practical basis to meet the needs of growing industries. Overall planning committees consisting of principals, department heads and key staff members were formed. The first step taken in establishing the new curricula was to determine what was needed to develop citizens with the knowledge, skills and attitudes to take their place in industry and the community. This was accomplished by making surveys of various sectors of industry that the school or institute was to serve.

Visitations were made to industries, corporations and workshops, and data collected by having interviews and discussions with managers, supervisors and workers. This enabled the committee members to get descriptions of jobs and operations performed by the technicians. The analysis of the jobs or operations served as a basis for determining what the school or institute could do to satisfy the needs and requirements of the community and industry. The pertinent skills, technical information and general knowledge to incorporate in the courses were obtained from the analysis made of the job requirements.

Objectives that were within the limitations and capabilities of the school or institute to attain were thus established. Teaching content of the area for which training was considered desirable and feasible as well as practical from an economic standpoint was selected.

The curricula offered should be dynamic and in pace with changes in industry. The need for evaluating the curricula was recognized early and necessary action was taken by initially forming a committee to draw up plans and procedures for evaluation. Education officers, school principals and key staff members were recruited to form a curriculum evaluation committee. This committee deliberated and discussed methods available for the evaluating process. The decision was to collect data by:

1. Framing and sending questionnaires to graduates of the institutes serving in industries and corporations throughout the country;
2. Sending members of the committee to meet and interview the administrators, senior officers and foremen of departments where the young graduates were employed.

The main theme of the questionnaires was the usefulness of subjects and parts of subjects offered at the technical institutes, and their relevancy regarding the type of work the trainees were required to perform. Technical institute graduates to whom the questionnaires were sent were holding a wide range of posts in various industries and corporations. These included: sub-assistant engineers, assistant engineers, foremen, township engineers, chargemen, shop managers and military engineers.

The persons holding the above-mentioned posts belonged to six different lines of trade: (1) civil engineering, (2) electrical power, (3) electrical communication, (4) mechanical power, (5) machine tools and design, and (6) mining engineering. The range of work experience acquired by these people was from one to ten years.

Analysis and interpretation of data. Many factors were taken into account for the analysis and interpretation of data received through the questionnaires. As previously mentioned the persons concerned are of six different trades and those of common trades were performing a wide range of jobs. Statistical representations of the frequency and pattern of responses were produced and analysed with caution.

Programmes offered to males and females

School/Institute	Male	Female
1. Technical Institutes	all courses	Civil and electrical communications only
2. Agricultural Institutes	"	All courses
3. Commercial Schools	"	"
4. Saunders Weaving School	"	"
5. Technical High Schools	"	None

School/Institute	Male	Female
6. Agricultural High Schools	All courses	None
7. Weaving High Schools	"	"
8. Handicraft School	"	All courses
9. General Repairs School	"	"
10. Domestic Science School	"	"
11. Basic Weaving Schools	"	"
12. Industrial Trades School	"	None

Experimental scheme for productive work

The Department of Technical, Agricultural and Vocational Education in its endeavour to promote the skills, knowledge and attitudes of the students, initiated an experimental scheme for productive work in 1968-69. The DTAVE also framed a slogan which was to serve as a guide for the schools and institutes under it. The slogan was: *"Train while producing, produce while training."*

The scheme. The Department of Technical, Agricultural and Vocational Education provided an initial fund of Ks. 30,000 (as a loan without interest) to an agricultural high school. The students, under the guidance of the principal and staff concerned, were to invest the funds provided in various projects and share the profits so earned. Since 1968-69, this scheme has been introduced into ten agricultural schools and one handicraft school.

Objectives of the scheme:

- to involve students in productive work while training in schools/institutes;
- to instil a sense of responsibility towards work and fellow students;
- to build up confidence in applying skills and knowledge to productive work;
- to provoke comradeship among students;
- to improve skills, knowledge and attitudes for students.

Execution of the scheme (Agricultural Schools and Institutes). Staff of the schools and institutes involved in the scheme advised and helped the students in making the scheme successful. A committee responsible for drawing up necessary plans was formed in each agricultural school and institute. Members of the committee were:

1. Principal – Chairman
2. A member of the teaching staff – Secretary
3. Representatives from the teaching staff and student body – Members

Taking into account such factors as the amount of land and water available, the type of soil and the market of the region in which the school was situated, the committees decided upon the types of crops and livestock to be raised and bred. The work was split into three main projects: (1) Animal Husbandry, (2) Gardening and (3) Farming.

Some of the crops and livestock raised in the schools and institutes were sugar cane, paddy, jute, menthol, maize, sesamum, cotton, pumpkins, gourds, cabbage, onions, carrots, poultry and pigs.

Twenty-five per cent of the profits earned each year was paid back to the DTAVE as annual payment of the loan. The remaining 75 per cent of the profits was shared by the students involved in the scheme. Methods of sharing profits depended on the way the work was organized and were quite different in some schools:

1. Seventy-five per cent of the profits from all three projects was shared by all the students involved; or
2. Seventy-five per cent of profits of each project was shared by students involved in that particular project; or
3. Seventy-five per cent of profits was shared by students according to the number of working hours put in by each student.

Handicraft school. Ks. 30,000 was also provided to the handicraft school, and the same terms offered to the agricultural schools for repayment of the loan were also offered to the handicraft school.

Execution of the scheme. The principal and staff of the school were responsible for the procurement of raw materials and marketing of the goods made by the students. All students in the school were involved in the scheme. Unlike the agricultural students they worked in groups according to the courses they were attending: (a) Book-binding courses, (b) Cane and bamboo works, (c) Leather works, (d) Sheet metal works, (e) Furniture and toys making, and others.

A study of the various projects carried out within the scheme at the agricultural schools/institutes and the handicraft school was made and findings reported to the DTAVE. Conclusions were drawn as below:

1. The scheme proved to be a great success in the sense that both students and staff gained vital experiences from the projects.

2. In monetary terms the projects were not as successful as expected. The maximum amount earned by a student of the handicraft school was about Ks. 600 for the whole year, while the maximum amount earned by a student of the agricultural schools was only about Ks. 300.
3. The projects helped nevertheless in building confidence in the students and made them aware of the kinds of problems they may encounter when working for themselves after leaving school.
4. Staff members of the schools could well study and evaluate interests, personality, industriousness, attitudes and skills of the students.

Productive work by the technical schools and institutes

The objective of the scheme was for students to be working on useful projects needed by the community. The school or institute would save material which would otherwise be spent on exercises or pseudo jobs. Students not only get more satisfaction because they know that the job they do will be useful to the community but also learn to appreciate quality standards of work. Since they know that they are participating in a scheme which is beneficial to the community and to themselves they are more interested in their project and usually gain good work habits. No special funds would be provided for the scheme.

The scheme for productive work. Schools and Institutes agree to accept jobs ordered by the community. The procedure adopted is as follows:

1. Principals/workshop superintendents to inform the community about the scheme; i.e.,
   a) Acceptance of various jobs which are within the capabilities of the school/institute;
   b) For every order placed at the school, proper 'Work Order' forms to be filled and detailed drawings and specifications to be submitted with the work order.
   c) Workshop superintendents in collaboration with departments concerned are to calculate cost of jobs.
2. Cost of material and 25 per cent of service charges to be returned to government funds.
3. Seventy-five per cent of service charges to be kept as special funds at the school/institute.
4. Accumulated funds to be used in ways beneficial to the school or students such as (a) Prizes for the students; (b) Expenses for

student excursion trips and outings; (c) Special stipends for students in financial difficulties; and (d) Books and magazines.

Following is a list of incomes of some schools and institutes for the year 1977-78.

School/Institute	Income in Kyats
1. Technical Institute at Chauk	4 297.00
2. Technical Institute at Kalaw	4 532.00
3. Technical High School at Taunggyi	16 633.40
4. Technical High School at Moulmein	4 114.00
5. Domestic Science School at Rangoon	14 151.30
6. Weaving High School at Mudon	5 072.25
7. Weaving High School at Meiktila	3 552.60
8. Handicraft School at Aung San	2 670.86
9. Basic Weaving School at Myitkyina	4 422.17
10. Basic Weaving School at Kyaukme	5 332.20

Comments on the scheme

1. The scheme was successful in the sense that its main objectives were achieved;
   - the school/institute was helping the community
   - the students were performing productive work
   - students were gaining vital work habits and skills
   - right attitudes were instilled in the students.
2. Costs of jobs undertaken by schools were clearly less than those produced elsewhere.
3. The workmanship of products was acceptable although slightly inferior to that of goods produced by other tradesmen.
4. The load on staff of workshops was excessive (planning, scheduling, supervising jobs and maintaining equipment and tools).
5. The schools/institutes were unable to accept all work orders because of other programmes and classes.

Conclusion

The Technical, Agricultural and Vocational Education System of the country is a centralized one and any change or improvement of curriculum involves many schools/institutes under the DTAVE. Suggestions for curriculum evaluation and improvement may originate at the teaching staff level and approval given by the authorities concerned. Suggestions may also come from the employers (industries, corporation, municipalities—) to the DTAVE or the Curriculum Committee concerned.

Once the decision to change or improve the curriculum has been made, there is very little or no resistance to the change and it is generally found that implementation of the new curriculum is less complex than the evaluation of the old curriculum and designing the new one.

There is also a minimum amount of difference between the curriculum plan and the actual implementation of the curriculum since the director, principals and teaching staff have already been involved in the design and development phases of the curricula. Regarding the curriculum, the employers commented that, generally, the graduates of the schools and institutes did not possess the level of skills required. This is undoubtedly true, but to acquire such level of skills necessitates practice in jobs and exercises which, because of time and other constraints, the schools/institutes cannot offer. The schools and institutes have provided the basic skills and some experience and the graduates can, with more industrial training and work experience, serve their employers and the country efficiently.

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CHINA

by Yuan Yiu-Zhong

Introduction

Before the founding of the People's Republic, China was not only poor in economy but backward in culture and education. In old China, there were only a few technical and vocational schools, most of them concentrated in Peking, Shanghai and other big cities. Since the founding of New China things have changed drastically. By 1978 there were 2,760 technical secondary schools with a total enrolment of 888,000 students, and 2,040 industrial vocational schools with enrolments amounting to 520,000. From 1949 to 1978, more than 5,230,000 students graduated from technical secondary schools. During the years of the First and Second Five-Year-Plans, industrial vocational schools turned out 1,450,000 skilled workers to meet the country's need. Great headway has also been made in other types of vocational schools and spare-time literacy and technical schools. Today, some 70,000,000 trainees are being cultivated in various types of spare-time schools; a considerable proportion of these schools offer elementary and secondary technical education.

Like other branches of education in China, technical and vocational education has undergone three stages. The first stage, which began in 1949, covered 17 years after the founding of the new republic. The second stage, from 1966 to 1976, lasted ten years when the "gang of four" played havoc with China's socialist construction. The third stage, starting from October 1976, has been characterized by restoration and consolidation.

The first stage

In the early years of the People's Republic, the government took over all the old institutions while setting about a cautious transformation of education. From the beginning of the First Five-Year-Plan in 1953, a great number of technical schools and industrial vocational schools were rapidly set up to meet the urgent need of the country's construction. At the same time, spare-time literacy and technical schools sprang up like mushrooms. Teaching programmes and curricula were worked out and approved, and textbooks revised or compiled. The government paid special attention to building up a contingent of teachers by selecting them from among college graduates and technical personnel. With the development of the national economy, educational facilities were gradually perfected. Laboratories, research centres, school factories and school farms were set up step-by-step, and the quality of teaching was improved. All this helped to provide the foundation of a network for China's technical and vocational education.

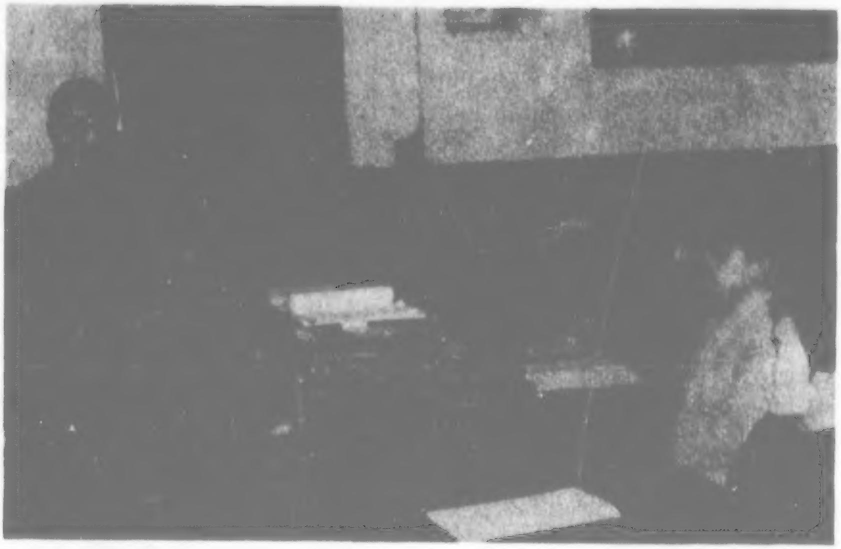
In 1958, Chairman Mao Zedong formally laid down China's principle for education: "Education must serve proletarian politics and must be combined with productive labour." He further pointed out that our educational principles must enable everyone who receives an education to develop morally, intellectually and physically and become a worker with both socialist consciousness and culture. From then on China's technical and vocational education was pushed on to a new stage of development. China now cares not only about ideological and political education but pays more attention to scientific and technical training. Students must participate in on-the-spot productive labour, while classroom teaching is also combined with practical production. As a result, experimental factories were set up beside engineering schools, and farms near agriculture schools. At the same time, some factories, enterprises and hospitals began to run schools thus making possible new developments in work-study programmes and practices. The number of technical and vocational schools increased considerably—and the quality of education was also very much improved.

The second stage

Throughout the ten years from 1966 to 1976, Lin Biao and the "gang of four" did their utmost above all to disrupt technical and vocational education. The number of full-time technical schools was slashed, part-work/part-study technical schools were closed down and most of the industrial vocational schools and other types of spare-time vocational schools were forced to close. Hardly any agricultural middle schools existed. The very few which survived were seriously handicapped with very little classroom teaching. As a result, the shortage in technical personnel on various fronts in China's socialist construction was unable to be made up.

The third stage

In 1976, the country ushered in a historic new period of development. The general task for the new period is to build China into a strong, modern socialist country before the end of this century. To achieve this, it is imperative to build up a great force of working-class intellectuals and to raise with tremendous effort the scientific and cultural level of the entire Chinese nation. With this picture in mind, we have to do our best to develop and improve China's higher and general education and, in the



meantime, to make great efforts to restore,and push ahead with, technical and vocational education. Over the past two years or so, much work has been done in this direction. But what we have done so far still falls far short of the need of China's modernization. It has been decided that, to bring China's national economy step-by-step on to the path of sustained, proportionate and rapid development, the three years starting from 1979 will have to be devoted to readjustment, restructuring, consolidation and improvement. At present the task in connection with technical and vocational education is to integrate our experience to carry out the Party's principle for education in a more correct and extensive way. We have to do a good job of readjustment and consolidation, and try our best to improve our teaching so as to comply with the requirements of the development of the national economy and the 'four modernizations'.

Curricula for technical and vocational education

Based on the practice of the educational work since the founding of the People's Republic in implementing Chairman Mao's fundamental principle for education, our basic experience as well as the practical guidelines for our future work can be summed up as follows:

1. *Technical and vocational education must comply with the requirement of the development of national economy.*

China's is a socialist economy, subject to development in a planned and proportionate way. Accordingly, a well-conceived plan is indispensable for training professionals and labour reserves. An appropriate proportion of technical and vocational schools to other types of general schools of various levels must be kept up. And, to keep pace with the development of production and construction and the trend of development in science and technology, new schools of technical and vocational education must be set up, new specialities offered, courses rearranged and added, and textbooks revised and compiled.

Thanks to the technical and vocational schools set up since the founding of the People's Republic, large numbers of technical workers have been trained. They have been playing an important role in socialist construction. China's technical secondary schools fall into the following categories: (a) Engineering, (b) Agriculture and Forestry, (c) Medicine, (d) Finance and Economy, (e) Arts, (f) Physical Culture and (g) Pedagogy. (The pedagogical schools are classified as one category of technical secondary school, but are not described in more detail in this report. There are two types of secondary normal school: those for primary school teachers and those for pre-school educators). Altogether 345 specialities have been offered in the other six categories of technical secondary school.

Engineering schools, for instance, specialize in such fields as metallurgy, mineralogy, coal mining, petroleum engineering, machine-building, power, electric engineering and equipment, electronic engineering, chemical engineering, civil engineering, water conservation, communication, tele-

communication and light industry. Corresponding specialities have been set up in the agriculture, medical, financial and economics schools.

Apart from technical schools, various types of industrial/vocational schools have been set up in a planned way; for example, those for the machine-building industry, coal mining, petroleum engineering, chemical engineering, electronic engineering, communication and light industry. In rural areas, agricultural middle schools, in addition to literacy courses, offer courses such as agronomy, plant protection, veterinary science, sericulture and agricultural machines.

The periods of schooling for technical and vocational schools vary. Technical schools that enrol graduates from junior middle schools set the length of schooling at three or four years. In general, a four-year course is provided in engineering (including agriculture machinery) schools and in veterinary and medical schools, while a three-year course is offered by agricultural and forestry, financial and economics schools. In recent years, with the development of secondary-school education and the marked increase in senior middle-school graduates, technical and vocational schools have expanded their enrolments to senior middle-school graduates who have completed a ten-year primary-secondary schooling. In this case, a two-year course is generally provided, or a little longer for some specialities in engineering or medical schools. A three-year course is given in industrial vocational schools which enrol junior-middle-school graduates and a two-year course for those enrolling senior-middle-school graduates. Agricultural middle schools are of two types: the senior and the junior. Their periods of schooling are on a par with those of general middle schools; a two-year course for the former and a three-year course for the latter.

2. *Integration of theory and practice*

The principle of integrating theory with practice must be carried out correctly throughout the whole process of technical and vocational education. The teaching of basic theories and elementary knowledge and the training in basic skills must be stressed and further improved.

Personnel turned out from technical schools are at an intermediate level between specialists and skilled workers. They must acquire not only necessary theoretical knowledge in science and technology but also sufficient practical skills. Therefore, the principle of integrating theory with practice must be upheld in their education. We must take the teaching of scientific and technical knowledge as the main task of education, while combining class work with productive labour. It is in this way that productive labour is included in the curriculum. By means of classroom teaching (including laboratory work, a course project and a graduation project),

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field work and productive labour, students learn basic theories, technical principles and methods, techniques of management of production, and the necessary operational skills. To achieve this, it is necessary to divide time between classroom teaching and productive labour in a proper way, and to decide on what kind of field work and productive labour the students should be required to take part in as well as in what way the field work and productive labour are to be combined with classroom teaching. We set the proportion of field work and productive labour to the teaching of theory at approximately 3 to 7 for engineering and agricultural and forestry specialities, approximately 3.5 to 6.5 for medical schools, and approximately 2 to 8 for financial and economic schools. In industrial vocational schools, the proportion may be 6 to 4, or in most cases on a half-and-half basis.

For students in these schools, productive labour should be brought, in the main, in line with their speciality although they may also be asked to take part in other kinds of labour for a spell. Students may work in factories and on farms attached to the school, or they may be sent to factories and farms outside the campus. School-run factories or farms are, by and large, set up to meet the need of teaching; they may also go in for social production with a view to combining teaching with productive labour instead of making economic gains. The government department concerned should bring their production into the plan and help them with the supply of raw materials and the marketing of their products.

In technical schools, especially in some old ones, there are experienced teachers and satisfactory laboratory equipment. In these schools, teachers are encouraged to engage in scientific and teaching-method research in an organized way, after teaching hours. Teachers and students must be encouraged to organize themselves to go in for scientific experiment and technical innovation within the frame of their plan for teaching, field work and productive labour. Engineering and agricultural schools must closely associate themselves with factories and agricultural people's communes and attempt to combine their teaching with technical experiment, popularization of new techniques and personnel training for the factories and communes. This can help not only to perfect the teacher's professional knowledge and the teaching work as a whole, but to raise production on the part of the producer.

3. *The principle of enabling the student to develop must be adhered to and efforts must be made to raise the quality of education*

To fulfil quality requirements set for education, we must follow Chairman Mao's instruction of enabling everyone who receives an education to develop morally, intellectually and physically and become a worker

with both socialist consciousness and culture. The teachers and students of technical and vocational schools must have deep love for socialism and conscientiously serve the socialist motherland and the people, and support the leadership of the Chinese Communist Party. Schools must however take scientific and technical education as their key task and persistently strive to raise its quality. The main task of a student is to learn. He must devote most of his class hours to the study of science and technology while spending a limited amount of time on courses of political science and taking part in necessary social and political activities.

To raise the quality of education, the whole process of teaching of each speciality (or type of work) must be conducted in accordance with the teaching programmes drawn and approved by the ministries of the State Council responsible for the work. Courses offered in China's technical schools fall into four categories: (1) political and social science, (2) courses of general culture (national language, foreign language, mathematics, physics, chemistry and physical culture), (3) basic technical courses, (4) specialized courses. Class hours for specialized courses make up about 25 per cent of the total instruction time; the rest take 75 per cent. For students with a record of a complete junior-middle-school education, courses of general culture at the senior-middle-school level are compulsory and, on this basis, they are further trained in the basic technical theories, specialized knowledge and operational skills necessary for production in their branch of modern industry. After graduation, the qualified students will be assigned jobs as technicians at an intermediate level.

Industrial vocational schools turn out skilled workers who are expected to acquire sufficient basic skills for a specific type of work and be able to fulfil a moderately complicated technical task while observing operating rules and cultivating the habit of production.

In agricultural and other types of vocational middle schools, the students are offered elementary courses on a par with those in general middle schools and side-by-side with some technical courses. After graduation they are qualified to go to college through matriculation or to obtain employment with their technical know-how.

Technical schools have syllabuses and textbooks of their own. Under the auspices of the Ministry of Education of the State Council, experienced technical school teachers, technicians and teachers from institutions of higher education are pooled to draw up the syllabuses and compile textbooks for political and social science, general culture courses and general basic, technical courses for engineering schools. To fit in with specific professions, syllabuses and text-books for other courses are worked out and approved by ministries concerned under the State Council. For industrial vocational schools, syllabuses and text-books are designed and approved by the General Administration of Labour. Agricultural middle schools adopt the text-books for general culture courses that are used in general middle schools. The educational departments at provincial municipal and autonomous regional levels are responsible for text-book-compiling for the technical courses offered in these schools. Teachers must conduct their teaching in accordance with a unified syllabus and use unified text-books. Meanwhile they can compile supplementary teaching materials to meet their particular needs.

The government has paid special attention to building up a contingent of teachers, raising their political and social status, and improving their working and living conditions. The Communist Party has explicitly pointed out that intellectuals belong to the working class, a force the Party relies on. This policy of the Party has brought the initiative of the masses of teachers into full play. Educational and various professional departments at different levels have not only selected among college graduates and technical personnel large numbers of suitable persons to replenish the contingent of teachers, but have also taken steps to raise their professional level and improve the quality of their teaching.

4. *In order to develop technical and vocational education to get greater, faster, better and more economical results, it is necessary*

to bring all positive factors into play and permit the development of a variety of forms in education.

In China, the principle for education must be universally applied and the goal must be one. However, different branches of education working for the common goal are permitted to take different forms. In other words they are permitted to present education in a way which may be called two simultaneous developments; namely, (1) the simultaneous development of educational undertakings both by various government departments and by factories, mines, enterprises and communes; and (2) the simultaneous development of full-time, part-study/part-work and spare-time schools. Full-time technical schools and industrial vocational schools can be run by departments of the State Council and local authorities or by factories, mines and enterprises.

All the trainees in industrial vocational schools as well as in art, physical culture, nursing, midwifery and coal mining technical schools and in all normal schools are grant-aided. Seventy-five per cent of the trainees of the rest of the specialities in technical schools receive grants.

Run by local authorities or communes, agricultural middle schools are part-study, part-work vocational schools, not only furnishing a general education to the students in rural areas but training technical workers for the modernization of these areas. As schools of this kind are not difficult to set up or expensive to run and as they charge the students' families no money for education, they are widely welcomed by local cadres and people in rural areas. Today, in many places, efforts are being made to reopen these schools that were forced to close down years ago.

The government has been urging local authorities, factories and enterprises to develop spare-time education for staff and workers and encouraging people's communes and production brigades to run spare-time schools for peasants. Over the past two years or so, with the development of economic construction, spare-time literacy and technical schools have mushroomed—thus playing an important role in raising the level of technology in industrial and agricultural production and the level of elementary and scientific knowledge of the broad masses of staff and workers.

The administrative structure of technical and vocational education functions under the unified leadership of the Central Committee of the Chinese Communist Party and the State Council on the principle of giving full play to the departments of the central and local governments on the one hand, and various professional and educational organizations on the other. Under the unified leadership of the Party, government departments and professional organizations at different levels are respectively in charge of the technical and vocational schools within the limit of their authority and in the scope of their profession. The Ministry of Education gives overall guidance with regard to educational affairs and is responsible for mapping out a comprehensive plan for the country's technical and vocational education. From the point of view of the jurisdiction system, technical schools fall into two groups: those affiliated to ministries under the State Council and those run by local authorities. Ministry-affiliated schools are either under direct jurisdiction of the ministry or jointly managed by the ministry and the enterprise affiliated to it. The schools which are run by local authorities to train technical workers for a specific locality are either under direct jurisdiction of a provincial, municipal or autonomous regional government department, or jointly managed by the local department concerned and a professional unit with a division of labour between them. Industrial vocational schools are under direct jurisdiction of the department concerned at the level of either the central or the local government in line with a specific profession. Labour departments at different levels also perform some management functions over them. Agricultural middle schools are supervised by the educational department of a county or the commune which runs them.

Innovations and experiments

At present the focus of work of the whole nation has been shifted to socialist modernization. The modernization of science and technology, with education as its foundation, is the key to the realization of socialist modernization. Education institutions must not only train large numbers of high-level specialists, but also professionals at an intermediate level and skilled workers. To promote technical and vocational education to meet the need of the country's construction toward modernization, improvement must be made as follows:

1. **Reforming the structure of secondary school education.** The first and foremost problem in connection with China's secondary education is the lop-sided proportion of the general middle schools to the technical and vocational schools, shown in the fact that the number of the former has far surpassed that of the latter. This has resulted in a difficulty on the part of youths to find work and the shortage of competent hands needed for socialist modernization. The government has therefore decided to change the situation by setting up step-by-step more technical and vocational schools of various types. Apart from this, great efforts are being made to develop spare-time technical and literacy education with a view to training more competent in-service staff and workers.

2. **Running technical schools and industrial vocational schools in a better and more earnest way.** Technical and industrial vocational schools have been a time-honoured institution in China, hence a fairly solid foundation, playing an important role in our socialist construction. To better

fulfil the requirements of the move toward modernization, the country must make greater efforts to improve its practice in this direction. What the country has been doing recently is to readjust the specialities and renew the teaching content. Over the past two years many new specialities such as electronic computer and automatic control have been offered.

Many schools are improving their teaching of new technologies. In order to raise the level of the education and the quality of our teaching, we are looking more closely into the problem of the length of schooling and the ways and means to improve the teaching of basic theories and the training of basic skills. Great efforts must be made to renew laboratory equipment and to improve work on text-book-compiling and teacher training. In addition, we have to consolidate the administrative structure, and to formulate and enforce regulations so as to bring into full play all positive factors to increase efficiency and enhance learning.

3. **To run agricultural technical schools in a better way and set up as many agricultural middle schools as possible.** China is a vast country with a population of more than 900 million people. Agriculture is the foundation of its national economy. It is all the more important to develop agriculture at a time when the nation is going to be modernized. To achieve the modernization of agriculture we must make a good job of running agricultural institutions of higher education and at the same time pay great attention to improving agricultural technical schools. We must set up as many agricultural middle schools as possible, and try our best to replenish agricultural training centres.

The practice of part-study/part-work in agricultural middle schools must be encouraged. Technical and vocational education in rural areas must be combined with agricultural production and must serve the modernization of agriculture in order to turn out more workers with expertise in that field. Schools must integrate technical training with scientific experiments and must popularize new techniques. We must exert ourselves to make it possible for every young farm worker to undergo a training course of agricultural technical school education before the end of this century so as to put our agricultural economy on a solid footing of modern agricultural technology.

It is our view that in order to develop China's education, we must sum up our own experience and be eager to learn from the practical experience of other countries. We must strengthen the contact and co-operation between Chinese educationists and those of the rest of the world to promote the development of education and the mutual understanding and friendship of people the world over.

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INDIA

by K. Gopalan

Introduction

Education in the early history of India was generally identified with liberal education and it was in 1854 that perhaps for the first time the need for the introduction of occupational education for a sizeable segment of the student population was highlighted by what came to be known as Wood's Despatch. Since then various Committees and Commissions have all emphasized the vital role of technical and vocational education in the country's economic and social development. Still it was only after 1947, when India became independent, that a comprehensive programme for the development of technical education and vocational training was undertaken. Today, the country has a big network of technical and vocational institutions offering a wide variety of education and training programmes in various areas of engineering and technology.[1]

At the end of 1973, there were 4,225 institutions offering technical and vocational education and training in various parts of India. A statement showing the distribution of these institutions, their types, sanctioned intake, enrolment and output is given in Table 1 on the facing page. It will be seen that 3,455 of these institutions were located in urban areas and the remaining 770 in rural areas. The total enrolment in these institutions was 504,442. While 380,669 students were enrolled in technical courses offered by the polytechnics, industrial training institutes and junior technical schools, only 123,773 students were enrolled in other vocational courses. The break-up of this enrolment among boys and girls was 379,460 and 124,982 respectively. During the year 1972-73, the students who graduated from these institutions numbered 197,[illegible]66. These institutions offered a variety of courses having different durations and admission qualifications. The total recurring expenditure during the academic year 1972-73 was about Rs. 560 million and the expenditure per student was Rs. 1,048.[2]

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[1] The scope of this article is limited to aspects of education and training of middle-level technical manpower, and skilled and semi-skilled personnel.

[2] Approximately 8.05 rupees (Rs.) = one US dollar.

Table 1. Distribution of Technical and Vocational Education and Training Institutions and their Sanctioned Intake, Enrolment and Output, 1973

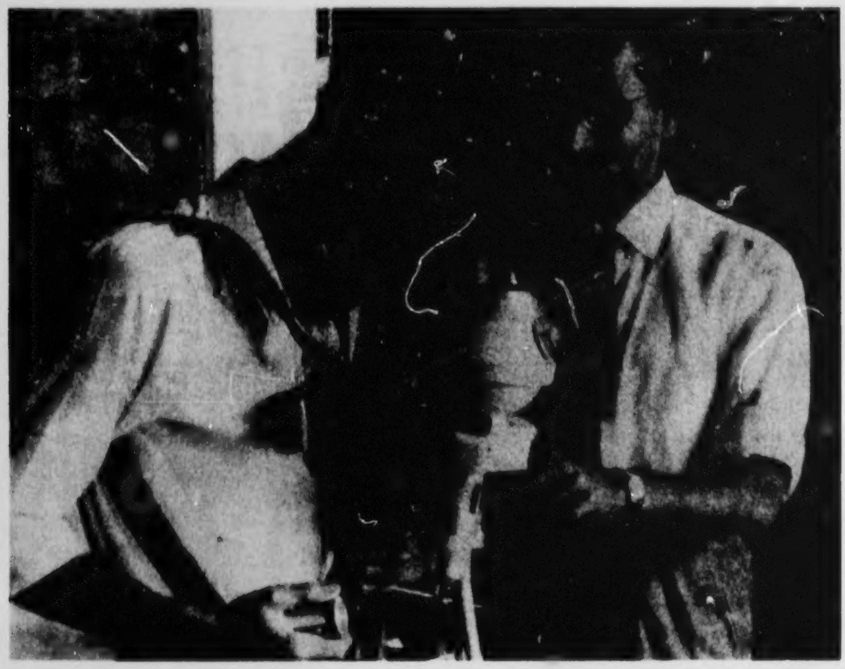
S. No.	Type of Institutions	No. of Institutions			Sanctioned Intake			Enrolment			Output		
		Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total
1	Polytechnic	295	32	327	46 460	3 628	50 088	95 008	7 494	1 02 502	15 836	883	16 719
2	Industrial training institutes	329	36	365	1 44 482	10 569	1 55 051	1 29 606	9 148	1 38 754	59 920	4 436	64 356
3	Craft and handicraft schools	293	177	470	11 303	4 030	15 333	13 402	4 273	17 675	6 986	2 884	9 870
4	Junior technical schools	216	50	266	16 418	3 174	19 592	38 024	7 285	45 309	4 950	755	5 705
5	Industrial and technical schools	1 131	263	1 394	67 640	9 605	77 245	66 410	10 019	76 429	33 568	4 957	38 525
6	Agricultural schools	48	57	105	2 560	3 004	5 564	3 092	3 450	6 542	2 158	2 624	4 782
7	Forestry schools	17	20	37	1 019	1 160	2 179	1 151	1 049	2 200	1 088	1 181	2 269
8	Veterinary and animal husbandry schools	17	4	21	988	415	1 403	1 366	450	1 816	1 396	446	1 842
9	Nursing, A.N.M. and health visitors' schools	504	22	526	21 595	434	22 029	33 465	905	34 370	13 184	370	13 554
10	Pharmacy schools	23	1	24	1 210	200	1 410	1 633	378	2 011	444	196	640
11	Other para-medical schools	63	5	68	3 332	245	3 577	3 811	248	4 059	3 132	196	3 328
12	Schools for training in co-operation	68	5	73	8 741	720	9 461	9 274	762	10 036	7 632	419	8 051
13	Commercial training schools	61	2	63	11 859	170	12 029	11 793	128	11 921	4 437	107	4 544
14	Schools for village level officers	58	39	97	6 780	6 471	13 251	7 262	5 445	12 707	4 777	3 570	8 347
15	Fishery schools	25	26	51	1 118	959	2 077	1 729	2 571	4 300	1 286	500	1 786
16	Schools for music, dance, drama, etc.	179	15	194	10 581	1 174	11 755	17 878	1 574	19 452	4 890	450	5 340
17	Schools for drawing and painting	53	9	62	4 231	341	4 572	6 224	517	6 741	2 063	316	2 379
18	Other schools	75	7	82	4 153	296	4 449	7 239	379	7 618	4 899	130	5 029
	TOTAL	3 455	770	4 225	3 64 470	46 595	4 11 065	4 48 367	56 075	5 04 442	1 72 646	24 420	1 97 066

Source : Third All-India Educational Survey-IAMR Report No. 4/1975-All India.

Technician Institutions (Polytechnics)

In 1962, Unesco said that "the term 'Technician' applies to persons working in occupations requiring a knowledge of technology and related sciences between that of a skilled worker and that of an engineer or technologist; occupations at technician's level may call for inspection and maintenance, detailed development plans, supervision of production work or detail construction. Collaboration with the engineer is an essential part of the work of the technician." The Huddersfield Conference on the Education and Training of Technicians held in 1966 identified technicians as being those people employed in the broad spectrum of occupations lying between the craftsman on the one hand and the professional (or technologist) on the other.

In India technicians are educated and trained in polytechnics. At the time of independence in 1947, there were 53 polytechnics with an annual intake capacity of 3,500 students and an annual output of about 1,500 technicians. Today India has some 335 polytechnics with an annual intake capacity of about 50,000, of which roughly 50 per cent come out as qualified technicians.



The technician diploma courses range in duration from two to four years, three years being the most common. The entry qualification is either 10 or 11 years of schooling. About 64 polytechnics offer 'sandwich-type' diploma courses and the remaining offer full-time institute-based diploma courses. Some diploma courses are run on the semester pattern, while others are on an annual pattern. The subject areas in which diploma courses are offered are the following:

List of technician courses offered in common polytechnics

1. Civil engineering
2. Mechanical engineering
3. Electrical engineering
4. Electronics/tele-communication/industrial electronics/radio/TV/sound equipment
5. Mining engineering
6. Metallurgy
7. Automobile engineering
8. Production engineering/technology
9. Pharmacy
10. Chemical engineering/operators
11. Architecture
12. Textile technology/chemistry/engineering
13. Ceramics technology
14. Instrument technology/instrumentation control
15. Refrigeration and air-conditioning
16. Printing technology
17. Leather/footwear technology
18. Paper and pulp technology
19. Commercial practice/secretarial practice and stenography
20. Construction technology
21. Tools technology/tools engineering/ tool design
22. Plastics technology
23. Town and country planning
24. Public health engineering
25. Agricultural engineering/agro-industrial engineering/agro-mechanical engineering
26. Electrical machine and appliances
27. Knitting technology
28. Garment technology/making
29. Ground water engineering
30. Mechanical and electrical engineering (combined)
31. Drilling engineering
32. Mines surveying
33. Petro-chemical technology/ engineering
34. Material handling technology
35. Power plant engineering
36. Technical sales representation/ salesmanship
37. Man-made textile chemistry
38. Man-made textile technology/ man-made fibres
39. Paint technology
40. Commercial art
41. Cinematography
42. Fisheries and navigation
43. Applied mechanics and electronics
44. Machine tool operation and maintenance
45. Welding and sheet metal/welding technology
46. Costume design and dress making
47. Wool technology
48. Materials management
49. Tube-well engineering
50. Home science
51. Structural fabrication and erection engineering
52. Optometry and refraction
53. Sugar technology
54. Industrial engineering
55. Medical equipment

About 24 polytechnics are exclusively for women and offer courses which are of special interest to women. They cater to the needs of the socially/economically inhibited classes who might be reluctant to take advantage of the facilities generally available in regular polytechnics.

Industrial Training Institutes (ITIs)

The Industrial Training Institutes (ITIs) train craftsmen/skilled workers. Today there are 356 Government ITIs spread throughout India. They are permanently affiliated with the National Council for Training in Vocational Trades (NCTVT) and have an annual intake capacity of over 158,000. They train skilled workers, in 32 engineering and 21 non-engineering trades approved by the NCTVT. In recent years 65 more Government ITIs have been given provisional affiliation with the NCTVT. In addition, there are 244 private ITIs, most of which are also thus provisionally affiliated.

Courses in the non-engineering trades are usually of one year's duration. Those for certain engineering trades are for one year and some for two years. The educational qualification for admission to these trade courses varies from two classes below matriculation (ten years' school education) to a pass in matriculation or equivalent.

Apprenticeship Training Scheme

Under the Apprentices Act 1961, it is obligatory for all employers in the specified industries to engage apprentices according to the prescribed ratio in the designated trades. The 131 trades designated under the Act follow the Indian National Classification of Occupations and cover 217 industries. Ratio of apprentices to workers (other than skilled workers) has been fixed for each trade. The apprenticeship duration ranges from six months to four years, three years being the most common. The entry qualification ranges from five to eleven years' schooling, depending on the trade. The industry is responsible for planning and executing the training programmes for the apprentices. This consists of basic training followed by on-the-job or shop-floor training with related instructions throughout the period of training. At present about 127,000 trade apprentices are undergoing training in 17,270 industrial establishments. In 1973, the Apprentices Act was amended to cover also graduate engineers and technician diploma holders. So far about 57 subject fields in engineering and technology have been designated and at present about 14,000 graduate/technician apprentices are undergoing training.

Vocational Training Programmes for Women

Although the programmes for training in ITIs and in industrial establishments are for men and women, the latter are generally not fully utilizing these opportunities for various reasons. In order to provide special facilities to girls for vocational training, a chain of training institutes exclusively for women has been set up recently at national, regional and state levels. These institutes train girls in dress-making, needle work, hosiery, secretarial practice and so on.

Advanced Vocational Training System (AVTS)

This project, which was introduced in 1977 in 16 selected ITIs and six Central Training Institutes (explained below), envisages the training of highly skilled workers and technicians in a variety of advanced and sophisticated skills such as process control instrumentation, metrology and inspection, tool design, heat treatment and others not available under the craftsman and apprenticeship training programmes. This is a step further towards the completion of a comprehensive and integrated pattern of training for industry.

Vocational Training for the Handicapped

Training programmes for the handicapped and mentally retarded persons are administered by a large number of Government agencies, private charitable societies and trusts. The Government of India, through the Ministry of Labour, is running ten Vocational Rehabilitation Centres. These Centres evaluate the deaf and dumb, the blind and the orthopaedically handicapped persons to assess their fitness and residual abilities. Adjustment training is then provided. Efforts are made to help them in getting on-the-job training or training for self-employment. The Ministry of Defence has established a number of rehabilitation units and training centres for the disabled from the Armed Forces. The Departments of Social Welfare at the Centre and in the states have a number of special institutes to rehabilitate the physically and mentally handicapped children.

Vocational Schools

India has recently introduced some major structural and functional changes in the pattern of school education in order to make it an effective instrument of national development and social change. Under the present 'ten-plus-two' national pattern of school education, the first ten years are devoted to general education with a good dose of socially useful productive work incorporated in the curricula. Socially useful productive work is described as manual work resulting in either goods or services which actually serve the community. Under this scheme, it is envisaged to provide useful opportunities for children to participate in social and economic activities inside and outside the classrooms to enable them to understand scientific principles and processes involved in different types of work and in the setting in which they are found. The main purpose is to develop proper attitudes towards work, to inculcate dignity of labour, banish status and class distinction and to stress the principle of productivity. The scheme enables the children to take care of simple functions such as repair and maintenance of domestic appliances and vehicles, care of garments, raising vegetables, and rendering social services. These are not only productive but in a sense also inspire self-confidence and self-dependence

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among the children. They may also gain some special proficiency in a particular skill.

At the 'plus two' higher secondary stage of school education, two distinct streams of courses are offered: one is the academic stream to prepare students for higher education in universities, and the other is the vocational stream to prepare them for a variety of occupations through vocational studies and training. By this arrangement, it is proposed to divert about 50 per cent of the student population to vocational courses. Vocationalization of school education at the 'plus two' higher secondary stage was launched in 1977. To begin with, the vocational courses have been restricted to areas of commerce, agriculture, home science, health, engineering and technology.

The main objective of vocationalization is to prepare vocationally qualified manpower for a variety of occupations for which training facilities are seldom available in other systems of training. All are full-time institutional courses and are now offered mostly in the same institutions where general education streams run. There are today about 1,150 vocational higher secondary schools with an annual intake capacity of about 40,000.

Teachers for Technician Courses

Development of subject matter competence, teaching ability and industrial orientation are the basic needs of a majority of technician teachers in India. Development of competence in curriculum development, management of industrial and human resources, and development of abilities in establishing industry-institution co-operation are the basic needs of senior faculty and administrators. With a view to training teachers and staff of polytechnics, the Government of India has established four Technical Teachers' Training Institutes (TTTIs), one each at Calcutta, Chandigarh, Bhopal and Madras. They offer long-term and short-term courses. A common feature of long-term courses is the interweaving of subject matter with pedagogy and industrial orientation. Teacher trainees practise these aspects in real-life teaching situations. Short-term courses are mainly meant for updating and refreshing the knowledge in various disciplines.

Instructors for ITIs and Apprenticeship Training

Six Central Training Institutes (CTIs) have been established for training instructors of Industrial Training Institutes and Apprenticeship Training Establishments. Their total intake capacity is about 1,084. The duration of the instructor training programme is one year. Training is imparted in pedagogy and the upgrading of skills. These CTIs also offer a large number of refresher and retraining programmes. A Model Training

Institute (MTI) of the same organizational structure as an Industrial Training Institute is attached to every Central Training Institute, wherein instructor trainees teach the craftsmen-students.

In 1977, the Central Training Institute for Women Instructors in New Delhi was elevated to being a National Vocational Training Institute for Women, with a view to increasing facilities for the training of women. This Institute provides special training in dress-making, needle-work, hosiery, electronics, and secretarial practice and work in collaboration with the two Regional Vocational Training Institutes for Women located in Bombay and Bangalore.

The following four special Central Institutes/Units provide supplementary training to the faculty and officers from industry, ITIs, CTIs and Government departments:

1. Central Staff Training and Research Institute (CSTRI), Calcutta
2. Audio-Visual and Printing Unit (AVPU), Kanpur
3. Foremen Training Institute (FTI), Bangalore
4. Advanced Training Institute for Electronics and Process Instrumentation (ATIEPI), Hyderabad

Apart from providing training, these Institutes/Units also conduct original research in trade training, develop teaching and demonstration materials and render advisory services to industry on various matters of industrial training with which they are concerned.

Teachers for vocational education in schools

Vocationalization at the higher secondary school stage was only introduced in 1977. Lack of teachers with adequate academic preparation and professional training is a major constraint in the implementation of the vocational education programme. At present, 84 new vocational courses have been started in various parts of India. Since all these courses are new, suitable teachers are difficult to get. The problem is dealt with by drafting professionals from various fields on a part-time basis or by appointing retired professionals. In a number of schools, there are certain technically qualified teachers whose skills and knowledge need to be brought up to date. This is being done by giving them short-term training courses of three to six weeks at a time. It is proposed to involve the TTTIs and CTIs closely in the training of teachers for vocational courses in schools.

Articulation of technical and vocational education with manpower planning

There has been considerable expansion in technical and vocational education. While on the one hand skilled workers are needed for manning the development schemes, a large number of skilled craftsmen and technicians are facing unemployment. Lack of a national manpower information system, imbalances in the estimated demand and supply of technical manpower, poor quality of craftsmen and technicians, and fluctuations of growth rates in industries and investments are some of the major reasons for this situation. Efforts are now being made to study these problems seriously.

The Government of India has recently decided to diversify and consolidate the existing courses and introduce new courses based on well-established and well-defined manpower needs. A reliable national manpower information system for storage, updating, retrieval and analysis of manpower information to assist technical and vocational education planning is proposed to be set up with the Institute of Applied Manpower Research in New Delhi as the lead centre. Community surveys have been organized for introducing need-based vocational courses in higher secondary education.

Continuing education programmes

Some efforts have been made to provide for vertical advancement of personnel from one level of technical education or training to the next one. Thus, a skilled worker with a national trade/apprenticeship certificate can take a diploma course and, similarly, there are facilities for those who have proven ability for academic achievement to go for specially designed degree courses. Availability of part-time and evening courses in some centres also allows for this vertical mobility. These facilities are offered at present only on a limited scale and within the structure of diploma/degree courses. There is a need to enlarge facilities for continuing education.

The pattern of various courses in India has so far been on rigid entry and exit points and has therefore not encouraged horizontal and vertical mobility. It has now been decided to introduce a credit system with provision for multi-point entry to part-time and full-time programmes. This is expected to bring in flexibility, thereby providing ample opportunities for continuing or further education to technicians and skilled workers at various levels.

Several polytechnics are offering part-time, evening, post-diploma courses for working technicians. A few engineering colleges in the country are offering admission to technician diploma holders for degree programmes. A proposal to start advanced technician programmes in selected polytechnics is now under the active consideration of the Government of India. The Technical Teachers' Training Institutes, Central Training Institutes and many other specialized agencies are already offering several short-term refresher and retraining courses in various areas depending upon requirements.

The vocationalization of education at the 'plus two' higher secondary school stage has been so structured as to make it both terminal and continuing. While most of the students of the vocational courses will enter the world of work either through self-employment or by taking a job, for those who wish to continue and improve their qualifications, various possibilities are available.

Guidance and counselling, problems and constraints

About 261 Employment Exchanges under the control of the Ministry of Labour have Vocational Guidance and Employment Counselling Units. In addition, University Employment Information and Guidance Bureaux function in 66 universities. These units and bureaux help applicants and youth in planning their careers and also give career counselling. They collect and compile occupational information and disseminate it to students, teachers, parents and job-seekers—both individually and in groups—through career talks, group discussions, career exhibitions, and film shows. Assistance is also rendered to applicants and students in securing training or apprenticeship opportunities and in providing part-time and vacation employment.

Even though India has made significant achievements in providing facilities for technical and vocational education, numerous problems and constraints have presented themselves in its development and improvement. The figures of student intake and output at technician level show that the wastage in the system is as high as 52 per cent; that is, if 100 students are taken for a technician course, only 48 ultimately qualify as technicians. Wastages in the craftsman training and vocational education systems are of the order of 20 to 35 per cent. Some of the reasons for this wastage are a lack of necessary aptitude among the students, inadequacies in instructional facilities, ineffective teaching, non-selective admission of students, mixture of urban and non-urban background of students, inadequate utilization of existing instructional facilities, lack of adequate financial resources for departmental operating and training costs, and inadequate employment opportunities.

Intensive study of the problem of wastage is very necessary. This is needed in both academic and planning considerations. Any effort towards the improvement of existing courses, the introduction of new courses and the diversification of programmes would be helped a great deal by such feedback information as would be available from such studies. From the planning point of view, any effort to reduce wastage would contribute to the efficiency of the system as such and thus provide for the output of additional manpower that may be required without further inputs.

Craftsmen training courses

The objectives of the craftsmen training courses are: (1) to ensure a steady flow of skilled workers in different trades of industry; (2) to raise the quality and quantity of industrial production by systematic training of workers, and (3) to reduce unemployment among the educated youth by equipping them for suitable industrial employment.

The scope of the curriculum is restricted to the particular trade in which the trainee receives training, keeping in view the objectives of the craftsmen training scheme. Acquisition of skills in specific trades is the central theme of the curriculum. Theory, drawing, computation and science in the curriculum are related and integrated with practical skills to be acquired. The curriculum envisages 104 weeks of training for two-year trades and 52 weeks of training for one-year trades. The training usually comprises one week of induction and 4-15 weeks of basic/allied trade training, the remaining period being devoted to the main trade training. A sample curriculum analysis is given below:

Curriculum component	% of total time *
Practicals	54
Theory	36
Drawing	5
Workshop calculations and science	5

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* These percentages are variable from trade to trade.

Those who complete the one-year ITI trade courses successfully can undergo training in industry for two years, and those who complete two-year ITI trade courses can have one year 'in-industry' training. During the in-industry training, the trainees have to spend seven hours a week in the institutes for instructions in related subjects; the remaining 35 hours of the week are spent in industrial training.

Tests are conducted at the end of each year for performance assesment. Those wanting a proficiency certificate (National Trade Certificate) should qualify in the All India Trade Tests conducted by the National Council for Training in Vocational Trades.

Vocational courses at the higher secondary school stage

The major objectives of vocationalization of school education at the higher secondary stage are:

1. To divert a sizeable section of school students to useful occupational programmes without sacrificing the educational content;
2. To prepare the students for entrepreneurial vocations, with a sufficient amount of the skills required for a particular occupational area; and
3. To prevent purposeless crowding in the universities.

The occupational areas which have been chosen for vocational courses can be broadly divided into six: agriculture, commerce, industry, home sciences, para-medical and miscellaneous. The curricula have been designed with a view to developing skills to the levels and quality acceptable to the employing agencies. Broadly, the frame of the curricula is as given below:

Type of study	Per cent of total time
Language	10-15
Basic subjects relevant to vocations	10-15
Vocational studies and practice	60-80

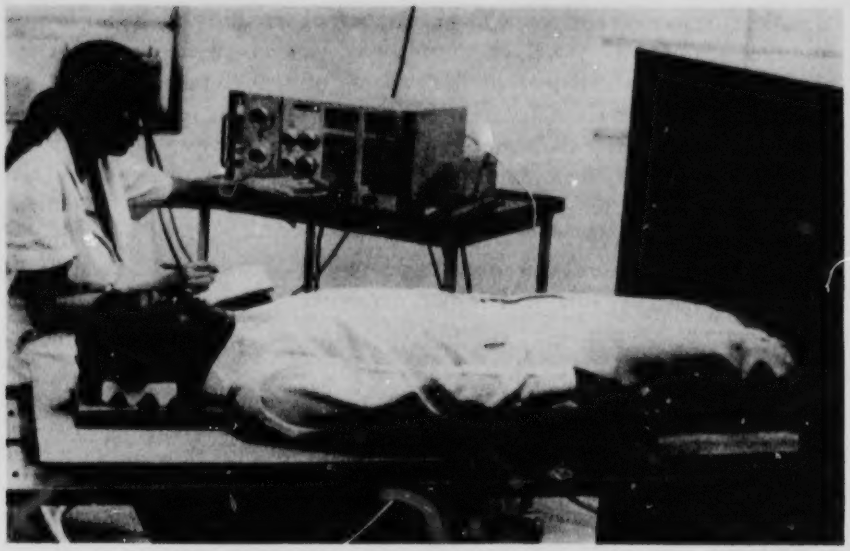
In any case at least 50 per cent of the total instructional time is devoted to vocational practice. The vocational practice may be partly in the schools and partly in the field. The programmes have been so prepared that education and training cannot be fully designed in the schools alone. Vocational practice is given in the local industries, agricultural farms, dairies, fisheries, hospitals, health centres, banks and other such organizations.

The method adopted to identify potential areas of occupation is carefully-conducted occupational surveys by district and/or by region. The surveys are conducted through questionnaires and personal interviews, and assess the employment potential, skills and knowledge necessary for the occupation and types of courses needed to meet these requirements. Such an analysis leads to the formulation of programmes and course objectives. Curriculum areas or components required to achieve the course objectives are drawn up. The subjects thus derived are further detailed for teaching and evaluation purposes.

Curriculum Development Centres

India has set up five curriculum development centres, one each at the Technical Teachers' Training Institutes at Chandigarh, Bhopal, Madras and Calcutta and the fifth one at the Allahabad Polytechnic. These centres are responsible for designing/redesigning, developing and evaluating curricula for technician education programmes in their respective regions or states.

Four stages have been identified in the curriculum process, namely: (1) curriculum design, (2) curriculum development, (3) curriculum



implementation, and (4) curriculum evaluation. These four stages are the elements of a feedback loop, emphasizing the need for continuous improvement of the system.

Curriculum design involves establishing job opportunities, listing the activities performed or likely to be performed by the products of the course in different job positions, analysing the knowledge and skills required for performing the activities identified, formulating the course objectives, identifying curriculum areas and course content depending on activity analysis, entering behaviour and constraints in the system, organizing the curriculum, evaluation scheme and working out resources required for implementation.

Curriculum development involves designing and developing instructional resources such as teachers' manuals, learning packages, teaching aids, item banks, text-books, and laboratory manuals. It also involves teacher development. All these activities are centred round the objectives and contents identified in the design stage.

In the curriculum implementation stage, teaching/learning is effected in the institutions using the instructional resources developed earlier.

In the curriculum evaluation stage, the curriculum, the instructional resources and the instructional processes are evaluated on the basis of feedback collected from various sources. The evaluation results are fed to the other three elements of the feedback system for improvement.

Curriculum design for a large number of technician education programmes has been very well accomplished. This has created an awareness and a sense of involvement in the process of technician education and training among polytechnic faculties, administrators of technician education and the professionals from industry. Considerable work has also been done in the area of curriculum development. A large number of instructional materials for teachers and students have been prepared. The curriculum has been analysed in terms of instructional objectives according to subject. Test items and questions, model question papers and their specifications consistent with the instructional objectives have been developed.

In all these activities, the polytechnic faculty and representatives from industry are actively involved.

Curriculum evaluation methods

Curriculum evaluation can be defined as the collection and provision of evidence, on the basis of which decisions can be taken, about the feasibility, effectiveness and educational value of a curriculum. The evaluation process can take place during the implementation of a new curriculum (formative evaluation) or it can occur after a new curriculum has settled down (summative evaluation). Strategies generally adopted during evaluation are either based on tests of achievements and criteria or on informed judgements resulting from observations, interviews and questionnaires. The first strategy tends to be restricted to those outcomes which can be objectively assessed, while the second tends to be subjective and unreliable. A hybrid approach involving different techniques becomes necessary for studying different aspects of a curriculum.

Curriculum evaluation as a fully-fledged project was undertaken by one of the curriculum development centres in 1975 and was completed in 1977. The evaluation was done under the following broad headings:

1. Learning strategies used by students
2. Teaching strategies adopted by the teachers
3. Complete examination system
4. Structure, timing, sequencing and presentation of actual curriculum
5. Support given by support material
6. Resource needs of the polytechnics, and
7. Organization and communication in the polytechnics.

The sources of information used in this project were students, graduate students, teachers, employees, examiners and educational administrators. The methodology adopted consisted of:

1. Actual observation of teachers in classrooms and laboratories;
2. Structured interviews with students, teachers and employers;

3. Assignment and criteria tests of students;
4. Filling of questionnaires by students, teachers and examiners, and
5. Collection of data on examinations from the education authorities.

This evaluation has formulated a basis of curriculum revision in some states and has further highlighted the need for improving the implementation process. It has brought into focus many deficiencies that existed.

Divergencies between curriculum planning and actual implementation

Much remains to be done in respect of curriculum implementation. Among the main problems are:

Lack of precise manpower forecasts. Lack of precise information on the quality and quantity of manpower required for different categories of jobs is an important constraint.

Lack of teacher competence. Any curriculum design should essentially take into account the competence of the teaching faculty. Any change in content or methodology should be judged in the context of teacher obsolescence as well as pedagogical preparation of teachers. Drastic changes in content in the curriculum cannot be made without a well-planned scheme for faculty development. Faculty competence both in content and pedagogy is a major factor influencing the design process.

Lack of resources. Efforts in improving curriculum require a variety of resources, lack of which on many occasions **is** a definite constraint. The instructional process is affected by technological inputs, software for teaching, equipment in laboratories, financial resources of institutions, competence of technical staff, and managerial and planning abilities of administrators and senior teachers.

Lack of academic flexibility. Technician education in India is academically controlled by the State Boards of Technical Education. These State Boards prescribe a common curriculum with little room for flexibility. The examination is also controlled by these Boards. Although grant of autonomy to polytechnics has been accepted in principle, the progress so far made is not significant.

Vocational courses, especially at the higher secondary school stage, are of recent origin and considerable divergencies have been observed between the stated objectives and the actual implementation. These divergencies are generally in the organizational plans, supply of suitable instructional material, availability of competent teachers and the examination system. All these are being closely observed and remedial measures are being proposed.

Innovations and experiments

Vocationalization of school education. The structural and functional changes which India has introduced in the pattern of school education recently is in itself a major innovation. Combining education with saleable skills and offering courses along with general education at the higher secondary stage is an experiment which is tried in the country for the first time. The traditional vocational courses offered in the polytechnics and Industrial Training Institutes have been carefully avoided and only those occupations which the country needs have been chosen. Another innovative aspect is the involvement of the community in the educational endeavour so that the institutional and community resources are fully utilized for preparing the future manpower requirements.

Extension centres of TTTIs. Efforts are now being made to plan and organize extension services in polytechnics, where the faculty from Technical Teachers' Training Institutes work in collaboration with polytechnic faculties to improve the teaching and learning process. Several such Extension Centres have already been established in various parts of India.

Rural development programmes. With the increasing emphasis on rural development, India has identified 35 polytechnics as 'Community Polytechnics'. These polytechnics will take up the work of the transfer of technology to the countryside, interact with the environment and organize their programmes and activities to meet the needs and requirements of the rural community. Over 70 per cent of the trainees in the ITIs are from rural areas and naturally these Institutes have been playing a useful role in artisan training of rural youth. Special efforts are now being made to co-ordinate the rural development programmes of numerous agencies in India.

Industry-institution co-operation. One of the major problems facing technical and vocational education has been the lack of adequate collaboration and co-operation between industry and educational institutions. Industries in India have now begun to realize their role in technical and vocational education. In order to effectively plan and supervise the industrial training programmes of engineers and technicians, four Regional Boards of Apprenticeship Training have been established. Four Regional Directorates of Apprenticeship Training look after the industrial training of trade apprentices

Another aspect of industry-institute co-operation is the involvement of industries in designing, developing, implementing and evaluating the curricula. Under the Quality Improvement Programme sponsored by the Government of India, technician teachers are being sent for industrial training for three months at a time to expose them to industrial situations.

The concept of 'adoption of polytechnics' by industry is gaining ground. Action is being taken to institute in polytechnics 'adjunct professorships' for engineers from industry and 'industrial residency' in industry for teachers from polytechnics. Institutions are also being encouraged to set up Consultancy Centres to promote consultancy services.

Entrepreneurship development programmes. These programmes are now being organized for technicians and craftsmen in order to provide them with the requisite knowledge and skills for starting small-scale industrial units. Financial institutions, small-scale industries organizations and district industries centres are keen to promote the entrepreneurial efforts of skilled craftsmen and technicians.

Learning resource centres. The role of resource centres in the instructional process is significant. They can help individualize the instructional process and make it more student-oriented. Remedial instruction to weaker students becomes easier through a variety of instructional alternatives. Such centres offer facilities to the teacher to design his own instructional strategies around the material and equipment available. It is proposed to establish Learning Resource Centres in a few selected institutions on an experimental basis.

Staff appraisal schemes. Appraisal of staff is a method of giving staff an opportunity to receive constructive and helpful comments about their performance without fear of punishment and with the prospect of recognition for achievement or the assurance of training if this is felt to be necessary. At present teacher appraisal is done primarily for administrative purposes. Confidential reports hardly represent the profiles and the strength or weakness of the teachers. Staff appraisal schemes based on methodology acceptable to the faculty are proposed to be introduced. These schemes would also enable identification of the needs of staff development.

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INDONESIA

by Tri Iswojo

Introduction

Since 17 August 1945, when Indonesia proclaimed her independence, various educational reforms have been conducted to increase the people's access to education, and in 1950 the government of Indonesia was able to run an educational system for the whole nation of 13,500 islands. The speed of educational expansion, however, as the result of the strategy adopted prior to 1968, was not supported by sufficient educational facilities to sustain the quality, efficiency and practicality of education. The government is now making a strong effort to remedy this.

Indonesia has adopted the system of a six-year primary school, three-year junior high school and three-year senior high school for its pre-university education. Alongside these there are also junior and senior high schools of technical and vocational education. Figure 1 illustrates the structure of the present system of technical education in Indonesia.

Formal schools in technical and vocational education

Technical and vocational education in Indonesia covers the fields of:

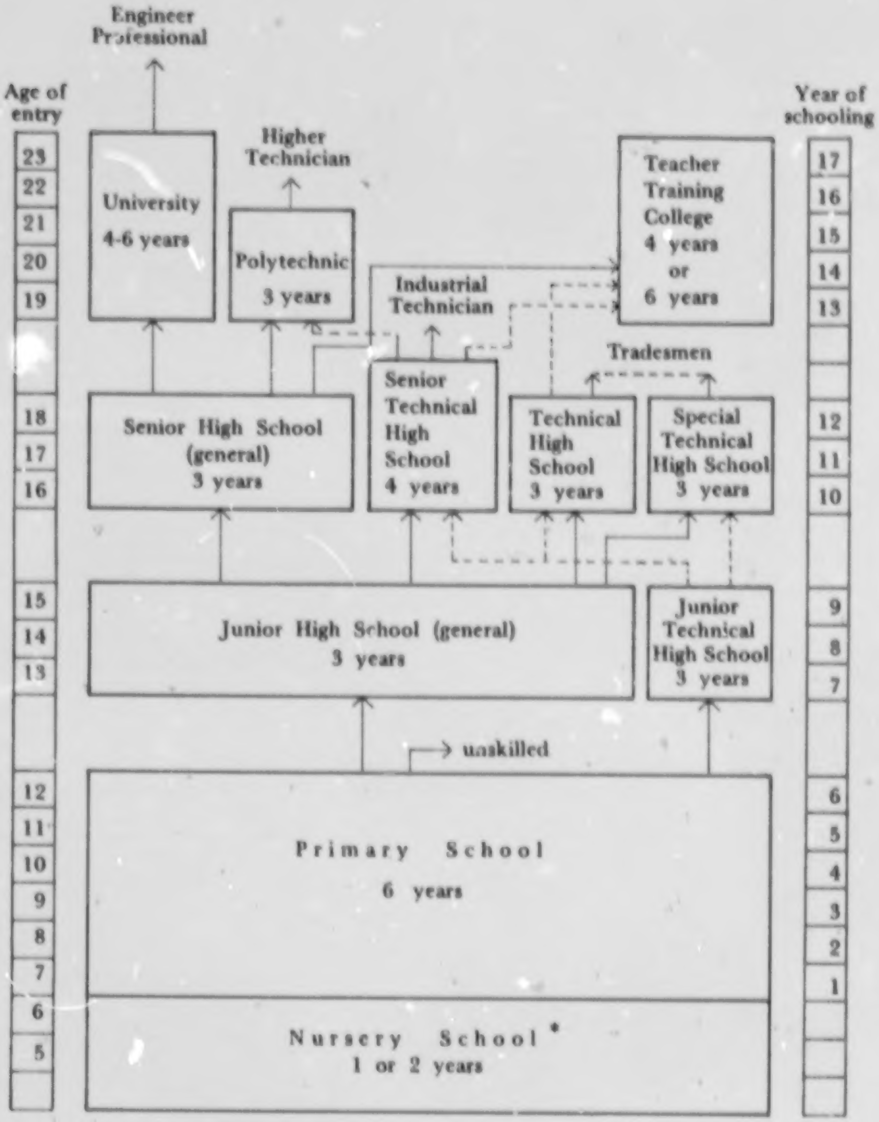
1. Home technology and social welfare
2. Arts and sports
3. Business and commerce
4. Agricultural technology and industrial technology

There are 15 kinds of schools that belong to the formal middle-level technical and vocational education. Fourteen of the fifteen are at senior-high-school level. At this level there are two types of programme: the three-year programme producing tradesmen and the four-year programme producing industrial technicians.

Entry prerequisites for the junior technical high school are a primary school diploma with the minimum age 12, success in an achievement and aptitude test conducted by the school, and mental health. For senior vocational high schools entry requirements are as follows:

- Diploma of general junior high school or junior vocational high school from relevant disciplines;

Figure 1. THE STRUCTURE OF TECHNICAL EDUCATION


Engineer Professional
Age of entry
23
22
21
20
19
18
17
16
15
14
13
12
11
10
9
8
7
6
5
University 4-6 years
Higher Technician
Polytechnic 3 years
Industrial Technician
Teacher Training College 4 years or 6 years
Year of schooling
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
Tradesmen
Senior High School (general) 3 years
Senior Technical High School 4 years
Technical High School 3 years
Special Technical High School 3 years
Junior High School (general) 3 years
Junior Technical High School 3 years
unskilled
Primary School 6 years
Nursery School * 1 or 2 years

* This is not compulsory.

– Age not more than 19 years; and
– Success in aptitude and achievement test.

The projected development of the technical and vocational schools in 1978/1979 - 1983/1984 is shown in Table 1.

Table 1. The numbers of technical and vocational schools (Senior High School level) in 1979/1980 and projected for 1983/1984

Kind of Vocational School	Existing schools (1979)	Schools projected 1983/1984
Senior High School:		
Home Economics	70	83
Home Technology	6	8
Social Works	8	16
Industrial Crafts	5	10
Music	2	5
Indonesian Arts	7	10
Fine Arts	3	8
Business and Commerce	240	313
Technical Education:		
– 4-year programme	8	16
– 3-year programme	130	148
Agriculture	5	21
Ship building, Graphics and Avionics	4	10
TOTAL	488	648

To meet the need for better teachers, in-service training for technical teachers is conducted at the national Technical Teacher Upgrading Centre (TTUC) in Bandung, and for vocational teachers at the national Vocational Teacher Upgrading Centre (VTUC) in Jakarta. An Arts Teacher Upgrading Centre (ATUC) is being developed in Yogyakarta. The minimum prerequisites to be vocational teachers at senior-high-school level are a bachelor's degree, mental health and age not more than 40. In some vocational disciplines this requirement cannot be fulfilled. In this case, there can be recruitment among the output from secondary high schools with some years of industrial experience and success in tests conducted by a Ministry representative. The candidates are then sent for certain periods of upgrading depending on the subjects they are expected to teach.

Promotion for secondary school teachers to government officials depends on their activities and initiatives. They are evaluated by their principals and can be promoted to higher rank through a Ministry representative after four years.

There are three sources of school finance: (1) routine budget; (2) development budget; and (3) donations from parents in the form of school fees. Routine budget comes from central government budget and is given to the school based on numbers of students. It is about Rp. 9,000.- (US $15) per student per year. Development budgets are taken from the development budget of the Ministry of Education and Culture. The development budget is given only to certain schools, especially those that are implementing the new curriculum. It is given for rehabilitating buildings, for school facilities such as equipment and learning resources, as well as for operational purposes such as consumable materials. The unit cost per student per year for the development budget is about Rp. 75,000.- (US $120).

School fees collected by the schools are handed to the Ministry representative. About 80 per cent of fees are returned to the school. School fees are calculated after considering the condition of the region and the level of education. Jakarta, for instance, has the highest fees, about Rp. 24,000.- (US $39) per year per student for senior high school.

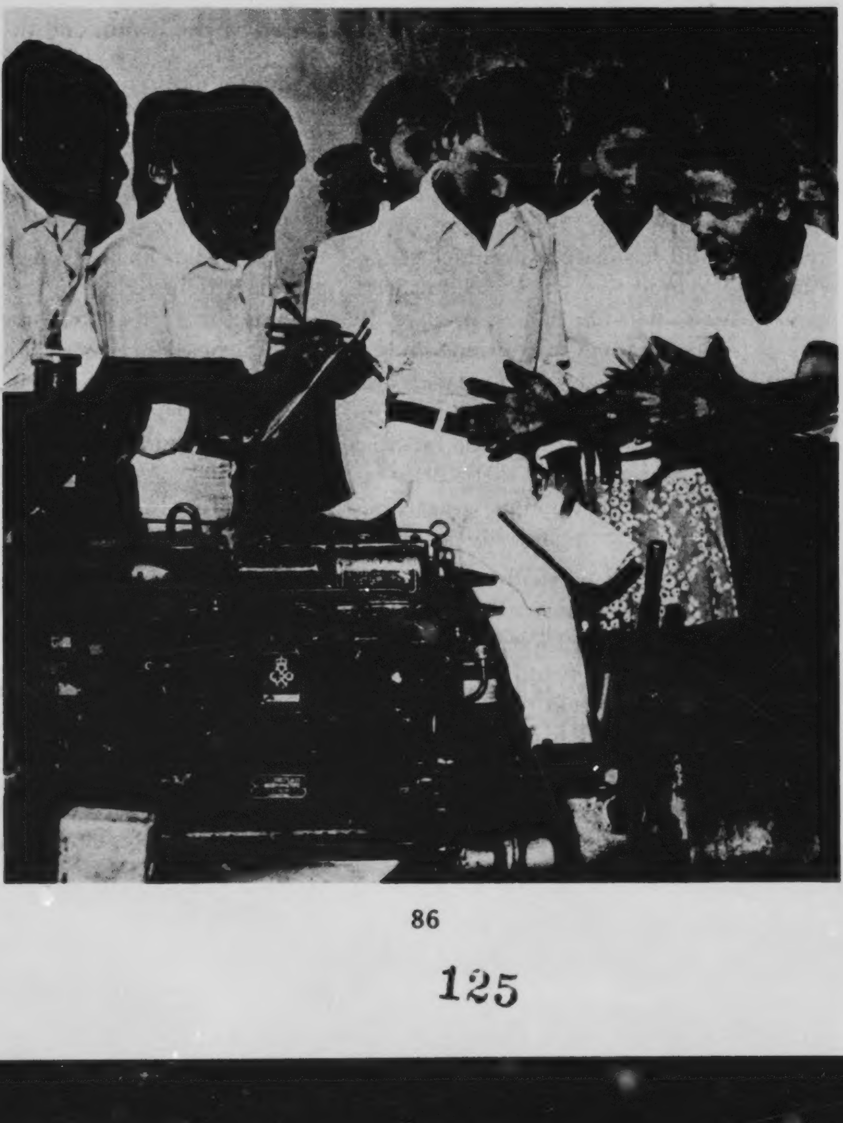
The curricula of technical and vocational education

Introduction. Up to 1965, and especially from 1960 on, due to the situation at that time, the number of technical high schools rapidly increased to 550 junior technical high schools and 120 senior technical high schools. The objectives of the schools were not clearly defined and indeed seemed to be dualistic; that is, prepare the students for work at the same time as preparing them to continue their studies in higher education. This confusing approach led to courses with a small number of periods for practice (four to six) and also a limited academic programme. The limited time for practice along with the poor facilities which existed produced poor results. The students faced difficulties in the world of work, and as they did not have enough academic education, they had difficulties in continuing their studies to higher education.

The process of curriculum improvement. In the beginning of the first Five-Year Development Plan (1968-1973), the problems in technical and vocational education were studied and potential ideas were developed. Educational planning, including questions of the rate of return, manpower and social demand, began to be studied in terms of the extent to which it could be implemented in the country.

The basic national policy–that education should meet the needs of national development–gave direction to the planners on the formulation of objectives, goals and targets for strategy planning and programming in technical and vocational education. Additionally, the National Development Policy included increased capacity and the establishment of an educational system to satisfy the implied and stated outcomes. This suggested that the educational planners should know the scope and possibility of development and diversification of the system in existence and the system required for national development. From the pyramid structure of education and manpower in developing countries, various qualifications or levels of manpower and its competencies, horizontally as well as vertically, were identified.

After analysing the situation, educational, institutional, curricular and instructional objectives were identified. Various meetings with people in business, industry and higher education as well as with professionals,



principals and teachers, produced the conclusion that the objectives and the orientation for technical and vocational education were to prepare students for employment.

During 1972-1975 the process of designing curriculum to meet industrial needs proceeded. At the end of 1975, a new curriculum, which emphasized industrial needs, was approved by the Minister of Education and Culture to be implemented in 1976.

The new curriculum. The main characteristics of the new curriculum are:

1. Job orientation;
2. A common semester in the first year for enlarging the horizon of the students and training their talents and interests;
3. Theory supports practice;
4. Minimum periods for practice of 16 periods (one week has 40 periods and one period is 45 minutes);
5. Based on a semester system of distribution.

The structure of the curriculum is as follows:

General Programme		Technical and Vocational Programme			
20%	+	Vocational Theory	40%	=	Technician
		" Practice	40%		Tradesman
					Skilled worker

The new curriculum approved by the Minister of Education and Culture covers 14 kinds of schools with 60 streams or disciplines. The new curriculum documents consist of three books:

Book 1. Covers the objectives of the institution and the structure of the curriculum for each kind of school.

Book 2. Contains the basic course outline.

Book 3. Consists of five booklets

3A is the directive of teaching
3B is the model for designing unit lessons
3C is the directive for evaluating the students
3D is the directive for guidance and counselling
3E is the directive for school administration and supervision

Implementation of the curriculum. There are some conditions to be fulfilled before a school is chosen for implementation of the Curriculum 76. Generally speaking, the school should be well programmed, well staffed, well equipped, well financed, and well managed.

Based on the condition of each school, in the year 1976 only 33 out of 126 senior technical high schools in Indonesia, or about 26 per cent, were chosen to implement the new curriculum; in 1977 another 10 per cent, in 1978 another 5 per cent and in 1979 another 5 per cent. In the implementation of the curriculum, there are no differences between rural and urban schools. All schools are open to girls as well as boys.

Enhancing the usefulness of school facilities. Although the schools have limited facilities, some efforts to make efficient use of school facilities began during the First Five-Year Development Plan (around 1970). The activity known as 'School Production Unit' provided a social relationship between the school and the society. The objectives are as follows:

1. To enhance the practical experiences of the students and make them realistic to the world of work, and
2. To develop the students' talent and their real ability in working.

Production units vary from school to school in aspects of management and name. For example, in the School of Arts, there is a Production Section and a Development Section; in the School of Home Economics, a School Production Unit; and in the School of Business and Commerce, a Sales Section.

The main advantage of the production unit in a school is to meet the objectives as above, but it also helps to reduce the operational costs. The disadvantage is that it could develop a separation of teachers of the general programme from teachers of the technical and vocational programme caused by their income variations. A major disadvantage could occur if the educational objectives were outweighed by profit motivation.

The efforts in utilizing the school facilities are still going on and they are directed to enhancing the efficiency and effectiveness of each educational objective, to improving the practice and to enhancing the cooperation between schools and industries. The problems faced by the schools are:

1. Directives, formal regulations or guidelines to manage the products have not yet been issued;
2. Most of the practices are conducted 'for the sake of practice' and the emphasis is on developing technical skills through repetition. The products of the students' practice are not yet directed to making finished products or useful things.

Our present regulation is that the products of students' practice may not be sold. If they are sold, the money should be returned to the government; it cannot be used directly by the schools. At the moment the

legalization of regulations on the institution, organization and management of school production units is being intensively discussed.

Evaluation. There are two types of evaluation that need to be carried out in the implementation of the new curriculum—the evaluation of the process of instruction, and the evaluation of the outcomes since implementation in 1976. The evaluation of the process of instruction has been carried out twice, the first in 1978 and the second in 1979. The results show that out of all the subject matter that should be given, only 60-70 per cent could be taught by teachers.

The problems faced were (1) the quality and quantity of teachers and (2) inadequate facilities. A programme to overcome these problems was then developed (see *The development of technical and vocational education in Indonesia,* published by the Directorate of Technical and Vocational Education, September 1979). The first products of the new curriculum came during February-March 1979. The evaluation of the economic value of the outcomes is proceeding and is conducted by the Teacher Training Institute, Pajajaran in Bandung.

Innovations

1. Technical Training Centres (TTCs). To meet the problem of inadequacies of equipment for practice, there is a project to centralize facilities. This centre, known as "Technical Training Centre" (TTC) offers practical training for from two to five senior Technical High Schools (THS) in the area. The respective THS is called THS-feeder. In the THS, the students only learn related subjects and general subjects such as language and religion while skill training is given in the centre. The same curriculum, in this case a new one, is implemented in the TTC and the THS-feeder.

At present there are five TTCs, located in Jakarta, Medan, Bandung, Surabaya and Ujung Pandang. They have been in operation since May 1975 and have a capacity of 3,000 training places. They accept 12,500 students from 15 THS-feeders on a shift basis and have a total of 4,500 graduates a year. Four new TTCs are being established in Yogyakarta, Semarang, Padang and Palembang. They are expected to be in operation in 1980 and will serve ten THS-feeders with an eventual addition of 3,000 skilled student graduates.

2. **Junior Vocational High Schools.** Before 1977 there were nearly 1,150 vocational schools of junior-high-school level. They consisted of 198 junior high schools of home economics, 394 schools of business and commerce and 554 schools of technical education. In 1977, based on the Ministry of Education and Culture Decree, 306 schools remained as vocational schools and the rest were integrated as general junior high schools.

In 1978, the objectives of the existing vocational schools were discussed at many meetings held by the government, which came to the conclusion that the schools would be directed to contribute to rural development. The development of these vocational schools is also meant to solve problems of implementing the adaptive technology in rural life.

Indonesia is a country in which 80 per cent of its 140 million population earns its living from agriculture. Only several thousand of 13,500 islands in Indonesia are inhabited. Prospects of developing the country's natural resources are very great.

The existing junior vocational high schools are now being reorganized with the following objectives:

1. To prepare students in skill training for potential self-employment;
2. To prepare students to work in rural co-operatives and other rural enterprises; and
3. To prepare students to work in assisting tradesmen.

The duration of the course is changed from three to four years after primary school. It will implement the multi-entry/exit system whereby students can leave the school after completing one or more 'packages' and may re-enter if they wish. 'Package' is the term used for a unit of knowledge, skill and working attitude of a certain programme that lasts one semester.

A certificate is to be given to students when they pass the examination on completion of a package. A diploma will be awarded on completion of eight packages of a programme.

The composition of the curriculum is as follows: skill training 70 per cent, related knowledge 20 per cent, and attitude development 10 per cent. Fields of training that will be developed in these improved junior vocational schools are:

1. Agriculture in its broad sense, including poultry, fishery, horticulture and dairy farming;
2. Rural family-life education;
3. Rural industry;
4. Handicrafts (waste products, wood working);
5. Mechanical training (farm mechanics);
6. Electricity (rural); and
7. Building (irrigation, simple housing and the like).

The designing of the curriculum for each package is under way and there is already a draft of the curriculum of 70 packages. It is planned that this programme be implemented on a small scale in 1982/1983. Two places have been intensively prepared to be the first schools to implement the programme; they are located in two transmigration areas.

3. **Technical Teacher Upgrading Centre (TTUC).** This centre provides upgrading courses for technical teachers and staff from all technical schools throughout Indonesia. There are now about 10,000 teachers who seriously need skill training and upgrading courses at various levels, but the centre can take only 2,500 teachers per year. The capacity of the centre to meet the need for better technical teachers is being increased. Another Regional Technical Teacher Upgrading Centre is being established in Medan.

Achievements

The First Five-Year Development Plan (PELITA I, 1969–1974) concentrated on developing middle-level technical and vocational education. The Second Five-Year Plan (PELITA II, 1974–1979) further emphasized the development of technical and vocational education. Programmes and national strategies have been developed and some progress has been made.

The five centralized workshops, called Technical Training Centres (TTCs) have been in operation since May 1975. They have a combined capacity of 3,000 training places and accept 13,500 students from the feeder STMs on a shift basis, thus injecting a total of 4,500 graduates a year into industry.

Four more TTCs are being established, one each in Yogyakarta, Semarang, Padang and Palembang, to service ten feeder STMs and produce an additional 3,000 skilled graduates a year. Twenty-seven STMs are being upgraded to produce 7,600 graduates per year. Seventeen STMs are being improved under an ADB Loan to produce 5,500 potential skilled workers per year.

Eight Senior Technical Schools (STM *Pembangunan*) have been developed which offer four-year courses for the training of industrial technicians. These are in Jakarta, Bandung, Semarang, Yogyakarta, Surabaya, Ujung Pandang, Temanggung and Pekalongan, and will be able to produce about 1,750 graduates per year. Four Rural Agricultural Technical Schools (STM *Pertanian*) offer three-year courses for training to rural agricultural development requirements at senior-high level, while four specialized Upper Secondary Schools (STM *Khusus*) are being fitted to offer three-year courses in the printing, marine, aviation and fishery industries.

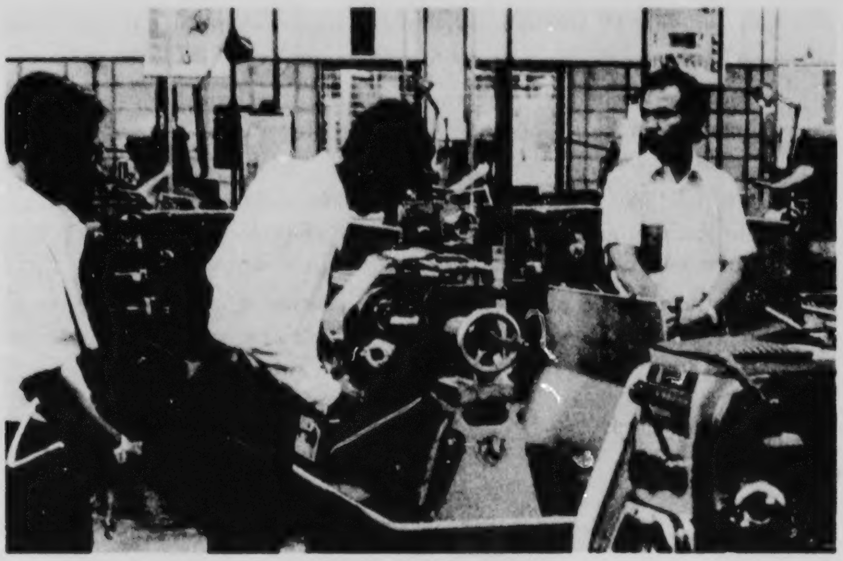
Forty-five Business High Schools (SMEA *Pembina*) have been developed to produce 8,000 graduates per year as potential office and business-practice technicians. Six Schools for Home Technology (SMTK) are being developed to produce 900 graduates per year, as potential home-technology technicians for the tourism and clothing construction industries, as well as for industrial and business institutions. Forty-five Home Economics Schools (SMKK) will produce 4,000 graduates per year as potential skilled workers in this field, and three Handicraft and Industrial Arts Schools (SMIK) are being developed to produce 600 graduates per year as potential skilled craftsmen for home industry and handicraft. Eight schools (SMPS) have been developed to produce 640 graduates per year as potential social workers, while 13 Schools of Arts (SM *Kesenian*) will produce 450 graduates per year as potential artists for music, painting and cultural pursuits.

To meet the urgent and vital need for better technical teachers, upgrading courses for serving staff are being conducted at the Technical Teacher Upgrading Centre (TTUC), Bandung. Two Technical Teacher Training Faculties (FKTs) are being equipped in Padang and Yogyakarta for the pre-service training of technical teachers, with an annual output of 500 per year after 1983. A Vocational Teacher Upgrading Centre (VTUC) is also being developed in Jakarta for other skills not covered by the TTUCs, such as business, commercial practices, tourism industries, home economics and social welfare. Five million text-books, consisting of 193 titles, have been printed, and other educational materials are now being developed, equipment standardized, and teaching and administration methods improved.

Plans for the future

The development of technical and vocational education based on the National Development Policy on Education in the Third Five-Year Development Plan is envisaged as follows:

1. Continuing the systematic development of technical and vocational education to provide skilled manpower in accordance with the requirements of the National Development programme.
2. Continuing the elaboration of plans for broadening employment opportunities and increasing production.
3. Continuing the rehabilitation of educational institutions and developing new institutions relevant to the labour market in terms of quality and capacity.
4. Enhancing the pre-service and in-service teacher education and training programmes.
5. Continuing the programme of text-book writing, reproduction and distribution, and the purchase of reference materials.
6. Improving co-operation with industry and business to increase the relevancy of vocational and technical education in meeting the need for skilled manpower by the establishment of an Advisory Board for Technical and Vocational Education.



7. Developing a skill evaluation system by the introduction of a National Trade Test programme.
8. Developing an effective vocational guidance programme.
9. Developing entrepreneurship training within the programme of technical and vocational education.
10. Enhancing co-operation with international agencies and developed countries in the transfer and adaptation of technology and industrial experiences.
11. Improving the effectiveness and efficiency of programmes of vocational and technical education, especially with regard to employment opportunities.

Achievements expected during the Third Five-Year Development Plan are, among others:

1. To complete the rehabilitation and new construction of 438 senior technical and vocational schools in order to implement the renovated curriculum of 1976 among a total of 584 institutions.
2. To construct 77 new senior technical and vocational schools emphasizing specializations which are of high economic value and potential in enlarging employment opportunities.
3. To adjust and rehabilitate 350 junior rural vocational schools required for the rural environment.
4. To recruit 12,500 new teachers for senior technical and vocational schools and 4,200 teachers for junior rural vocational schools.
5. To give further training to 8,000 senior technical and vocational school teachers and 2,800 teachers for junior rural vocational schools.
6. To produce and distribute 10.5 million text-books for senior technical and vocational schools and 3.5 million text-books for junior rural vocational schools throughout the country.

By achieving the above, it is expected that 153,000 graduates of senior technical and vocational schools and 48,000 graduates of junior vocational rural schools may enter the work force.

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JAPAN

by K. Takada

Introduction

Upper secondary education in Japan is divided into two parts: general and specialized vocational education. The percentage of lower-secondary-school graduates going on to upper-secondary schools has grown rapidly to more than 93.5 per cent on a national average in 1979. Accordingly, the improvement of the upper stage of education in response to students' varied abilities, aptitudes and activities has become a major problem.

The curricula of some upper-secondary-level courses, those taken part-time or through correspondence, generally require four years or more to complete. Graduates of these courses qualify for university entrance examinations, on an equal basis with graduates of full-time upper secondary schools.

In other forms of organized vocational education, there are a number of special training schools and miscellaneous schools. Special training schools aim at developing the students' abilities as required for their working or daily life, or at raising their general education level. The schools offering upper-secondary courses are called upper-secondary special training schools (*koto-senshu-gakko*) and those offering advanced or college courses are called special training colleges (*senmon-gakko*).

Miscellaneous schools provide people (mostly young people) with vocational and practical courses in dressmaking, cooking, automobile driving and repairing, computer techniques, and so on. For admission, most courses in miscellaneous schools require the completion of lower secondary schooling, while some require the completion of an upper secondary school course.

In higher education, technical colleges inaugurated in 1962 are institutions aiming at training technicians. Junior colleges offer two or three-year courses. The evening course programmes in universities take four or more years to complete.

Vocational education in upper secondary schools

In the upper-secondary vocational courses, education is given with an aim to developing in the students the qualities and abilities essential for various kinds of work. In general courses, too, the curricula include vocational subjects. As of 1978, vocational subject areas and subjects were taught in 66.4 per cent of all public, general, full-time, upper-secondary schools.

Most of the students who complete vocational courses enter a vocation after acquiring the knowledge and skill required for various types of jobs, but there are some who are able to go on to universities and other institutions of higher education.

The employment practises in Japan mean that school graduates, once employed by a certain company, keep working with it until they reach the age limit, with relatively few of them moving to other firms on the way. Accordingly, even at a time of world-wide business recession, the unemployment issue as regards young people, including fresh school graduates, has not become serious. Counselling activities for students undoubtedly help in this situation. The counsel, which is given during home-room hours to students enrolled in any type of course, deals with the choice of subjects they should learn, future job potentialities and how to adapt to their vocational life in the future.

The Ministry of Education, Science and Culture, prefectural boards of education, and prefectural educational centres provide opportunities for systematic in-service training for public school teachers, principals and supervisors. Some of the larger municipalities and educational study groups also hold workshops and study meetings for in-service training.

The Ministry holds each year central workshops for the intensive in-service training of principals, vice-principals and teachers in charge of middle management, who are selected and sent by every prefectural board of education. Vocational education teachers are also provided with training in new technical and instructional methods. Prefectural boards of education also organize in-service training programmes. Prefectural education centres, which have lodging facilities, educational equipment and apparatus, and professional staff, take an important role in in-service training.

In Japan, the predominant aim of in-service training is to improve teachers' professional abilities. Participation in in-service training programmes is not normally rewarded with salary increase.

Education and training

Organized education and training for the purpose of acquiring the skill and knowledge necessary for an occupation, has been built upon two systems. One is vocational education in a narrow sense, which is being undertaken in school education under the jurisdiction of the Ministry of Education, Science and Culture, and the other is vocational training being conducted under the jurisdiction of the Ministry of Labour.

In preparing lower-secondary-school curricula, consideration is given to such vocational subjects as technique and home-making, industry, business and fisheries, according to the real situation of the communities and the schools. In most cases, vocational subjects such as industry, 'technique' and home-making are optional, and are taught in the third grade. Upper-secondary school is divided into courses, one offering mainly general education while the other concentrates on specialized areas in which vocational education is being conducted–typically these would be agriculture, fisheries, industry and business.

In contrast, the vocational training system is primarily aimed at enabling workers to improve themselves by acquiring the knowledge and skills required for engaging in certain specific occupations. This is achieved through practical and tangible experiences, and is based on completion of either lower-secondary or upper-secondary education.

In other words, vocational training is designed to provide trainees with occupational skills and technical know-how, as well as to foster an attitude of efficient productivity. It is quite limited to those matters directly required for carrying out the work.

Vocational courses exist in 2,882 of a total 4,978 upper secondary schools (as of 1 May 1976). Out of a total of about 4,409,000 upper-secondary school students, about 34 per cent or around 1,484,000 are enrolled in vocational courses (as shown in Table 1, on page 98). Out of a total of 9,092 sub-courses instituted in all of these upper secondary schools, 5,754 are related to vocational courses.

Vocational training instructors

Vocational training instructors who are in charge of basic training and re-development training in the public vocational training facilities and the authorized vocational training facilities are required to have a licence from the Ministry of Labour. The administrative work concerning this licensing is handled by the prefectural governor, as entrusted by the Minister of Labour.

The licence may be given to those who have completed long-term instructor training courses or the short-term instructor training courses of the Institute of Vocational Training; those who have passed the examination for vocational training instructors organized by the prefectural governors; and those who are recognized to have an ability equivalent or superior to the first two categories (e.g., those who have passed the first-grade trade skill test and have completed a lecture course designated by the Ministry of Labour). The licences covered 144 trades at the end of December 1978.

Table 1. Total number of courses and enrolments in upper secondary schools

a) Number of courses (Vocational education courses and General courses)

Total	General	Agriculture	Industry	Business	Fishery	Home economics	Others
9 092	3 338	1 330	2 294	1 103	164	623	240

b) Number of courses (Public and Private)

	Public			Private		
	Full-time	Part-time	Total	Full-time	Part-time	Total
Total	7 547	1 545	9 092	2 346	61	2 407
General	2 575	763	3 338	1 119	29	1 148

c) Number of students

Courses	1978		1979	
	Enrolment	Per cent	Enrolment	Per cent
Total	4 409 455	100.0	4 326 737	100.0
General education	2 925 777	66.4	2 725 818	63.0
Agriculture	200 487	4.6	196 012	4.5
Industry	473 435	10.7	508 474	11.8
Business	579 726	13.1	625 599	14.5
Home economics	199 160	4.5	195 314	4.5
Others	30 870	0.7	75 520	1.7

Source: Ministry of Education, Science and Culture. *Report of Basic Statistics.*

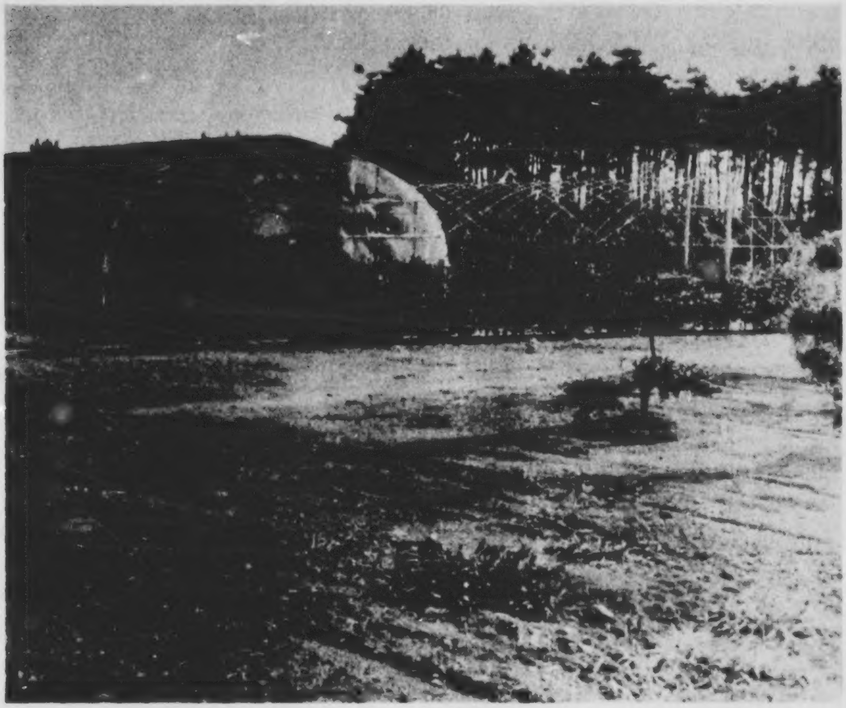
Curricula of technical and vocational education

Under the education system in Japan, vocational education is undertaken principally at the upper-secondary level. There are two major courses–the general course and courses geared chiefly to technical education, which concentrate on such areas as vocational education (including agriculture), musical education and physical education.

The courses geared chiefly to vocational education at present consist of one each in agriculture, industry, business, fisheries, home economics and nursing. These courses are further divided into 241 types of so-called 'sub-sources', where education is given with an aim of training middle-level technicians in the respective industrial and vocational sectors.

The curriculum compilation depends on the course of study, revised by the Ministry of Education, Science and Culture. While the number of credits required before graduating from an upper secondary school is set at 85 and above, the curriculum of the vocational course is composed of the general subject areas and subjects with 62 credits and above (46 credits and above for a female student) and the vocational subject areas and subjects with 35 credits and above. One credit represents the 35-unit-hour lesson per school year, with one unit-hour calculated at 50 minutes.

The so-called *senko-ka,* an advanced course, is offered in selected schools at present. This course is of one or two years' duration and aims at giving further training to those who have finished upper secondary school. In the field of agricultural education, it is intended as follow-up training for the graduates of upper secondary schools, particularly those engaged in practical farming. There are several other types of follow-up training for graduates of vocational courses.



Tents of two layers of nylon utilize solar energy by storing up the sun's heat as protection against night frost.

Policy of vocational education

Under the terms of the Industrial Education Law, founders of upper-secondary schools are provided by the national government with a subsidy for installation and improvement of the facilities and equipment for industrial education. More favourable budget allocation is made for securing the prescribed number of teachers in charge of vocational courses than for securing the prescribed number of teachers in charge of the general course. Furthermore, better pay is provided to the vocational teachers in charge of the subjects in which experiments and practices are involved. In addition, with a view to improving the teachers' instructional ability in experiments and vocational education practices, national and local governments provide the teachers in charge with in-service education and training.

Attempts have been made to improve educational content and methods, and also the facilities and equipment available for experiments and practices, in order to keep pace with the increasing diversity of the students, thanks to the increasing number of lower-secondary school students going on to upper secondary schools, as well as the rapid economic and social development of the nation.

During the last several years, however, a decline in the number of students applying for the vocational courses of upper secondary schools and an increase in vocational-course-enrolled students wishing to go on to universities have become noticeable. Such new problems as the changes in the ability and aptitude of students enrolled in vocational courses and the reluctance of students to think about their future careers have also come to the fore.

In the meantime, the demands of society on vocational education have also been changing due to modernization of the industrial structure and the progress of technical innovations. Thus, vocational education is faced with the need for review.

The vocational training system

Vocational training is largely divided into basic training, technical improvement training and occupational re-development training. It is conducted in public vocational training facilities, going under the name of statutory vocational training, for which training standards are prescribed in a Labour Ministry ordinance.

As regards the promotion of vocational training in private sectors, employers conduct various vocational training schemes for employees to learn necessary skills and to increase their capabilities. Schemes which meet the training standards prescribed in the Labour Ministry ordinance may obtain a certificate of compliance by applying to the local governor. For the training schemes conducted by the employers of middle- and small-sized companies, the national and local governments give subsidies for two-thirds of the expenses of the facilities and operations. An outline of the statutory vocational training schemes appears below.

Table 2. Statutory vocational training schemes (1978)

Kinds of training	Training course	Outline of training	Training facilities
Basic training	General training course	Training aimed at giving the basis of trade skills, mainly to recent graduates. Period: one year for middle high-school graduates and six months for high-school graduates.	Vocational Training Centre (VTC)
	Ordinary training course	Training aimed at giving the basis of trade skills with multi-functions, mainly to newly-graduated people. Period: two years for middle high-school graduates and one year for high-school graduates	
	Special training course	Two years' training aimed at fostering high-level trade skills, mainly for high-school graduates	College of Vocational Training (CVT)
Upgrading training	Training course for first-grade certified skilled workers	One-to-six months' training for persons who wish to become second-grade certified skilled workers. (In case of the correspondence system, one year's training)	Vocational Training Centre (VTC) Skill Development Centre (SDC)
	Training course for second-grade certified skilled workers	One-to-six months' training for persons who wish to become second-grade certified skilled workers. (In case of the correspondence system, one year's training)	
	Supervisory training course	Training within 11 days aimed at increasing supervisory abilities for supervisors or persons who wish to become supervisors	
	Skill up-grading training course	Training for more than 12 hours aimed at adding to the necessary skills of existing workers, responding to the levels of their skills.	Institute of Vocational Training (IVT)
Occupational capacity re-development training	Job conversion training course	Six months' training mainly for the unemployed and displaced workers needing to be re-employed	VTC SDC

Standards for vocational training

Statutory vocational training is governed by the standards of vocational training prescribed in a Labour Ministry ordinance. These standards govern not only the curriculum of each training course but also facilities and equipment. The vocational training centres may modify these standards whenever necessary, to prepare curricula that will meet their special needs, as well as those of local industries and enterprises. The technical ability and the scope and level of related knowledge the trainee is expected to acquire have been given for each course, in stages, as have time requirements and detailed breakdowns for each subject.

Innovations

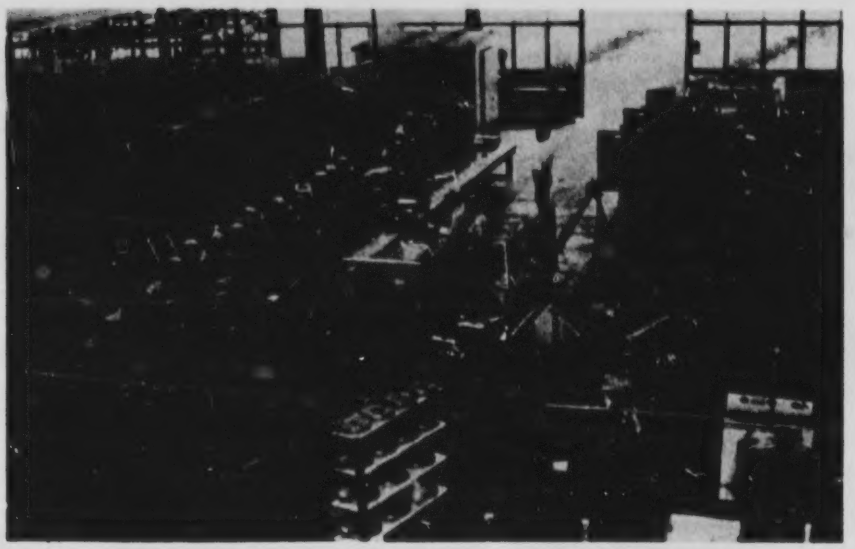
In 1973 the Ministry of Education, Science and Culture set up the Committee on Improvement of Vocational Education within the Industrial Panel of the Science and Industrial Education Council, and had it study measures for improvement of vocational education.

After more than three years of deliberation, the Committee presented to the Industrial Education Panel in 1976 a report entitled *Measures for Improvement of Vocational Education in Upper Secondary Schools.* This report recommends measures to improve vocational education at a time when more and more people are seeking a higher educational background, with an emphasis on fundamental educational content while attaching greater importance to practical training. The major points of the report are the following:

A. **Vocational education in upper secondary schools** should be improved so that it forms the basis of technical/vocational learning, while maintaining the current system of undertaking vocational education in each relevant department.

1. The contents of technical subject areas should be improved so as to better emphasize fundamental education. For this purpose, the fundamentals of each specified subject area should be studied, and the current composition of subject areas and subjects should be reviewed with an eye to their overall readjustment and integration.

2. To improve the teaching of technical subject areas and subjects, stress should be laid on such practical, empirical and exploratory methods as experiments and practices that are characteristic of vocational education. Experimental and practice methods should be improved with more attention paid to inspiring students' desire to learn, fostering their ability to solve problems in a creative manner and having them build up a wholesome view of working and jobs.



Workshop practical training is carried out with remarkable discipline.

3. The curriculum of the vocational course should be flexibly coordinated by such means as reducing the number of total credits for each compulsory subject area and subject and the minimum required number of credits for technical subject areas and subjects, thereby enabling each school to organize a distinctive curriculum suited to the actual conditions of the particular region and characteristics of the students.

4. In general, the vocational course should be so composed as not to be classified into too many specialized sub-courses. Accordingly, only the comprehensive or basic standard courses should be defined in the curriculum. More elastic ways of administering each course should be devised by such means as recruiting fresh students in a group for major courses.

B. Educational methods in primary, lower-secondary and upper-secondary schools should be improved, with a view to enlarging students' opportunities for empirical learning related to actual work, so that they may be able to think about the significance of work and cultivate a positive attitude towards it.

1. While the principle of work-related empirical learning through all educational activities in schools should be emphasized, it should be especially promoted in special and extra-curricula education activities.

2. Particularly in upper secondary schools, the opportunities for such learning should be provided systematically to students of regular courses,

who usually receive little of it. To enlarge the opportunities for this sort of learning, the feasibility of instituting a new subject should be studied.

C. **With a view to making the vocational courses in upper-secondary schools** more attractive to students, necessary measures should be taken to give better guidance to lower secondary-school pupils on their future course in life, to improve the method of selecting the students qualified for admission to upper secondary schools, to give much closer co-operation with universities and other institutions of higher education, to give more serious consideration to vocational qualifications and vocational skills tests, to enhance teachers' instructional ability, and to improve facilities, equipment and textbooks.

On the basis of the above report the course of study is being revised. New educational content is scheduled to be introduced with the first semester in 1982, and the design of textbooks is also under way. In addition, a revised course of study for upper secondary schools was drawn up based on the following four guidelines:

1. To respect the independent initiative of individual schools so that they may maintain and develop their distinctive education system;
2. To ensure that the content of teaching be better adapted to the differing abilities and aptitudes of individual students;
3. To ensure that students may lead a relaxed and full school life;
4. To ensure that students may get a better understanding and greater enjoyment of working life through some experience-oriented learning, and to lay emphasis both on moral and physical education, aiming at the full development of students.

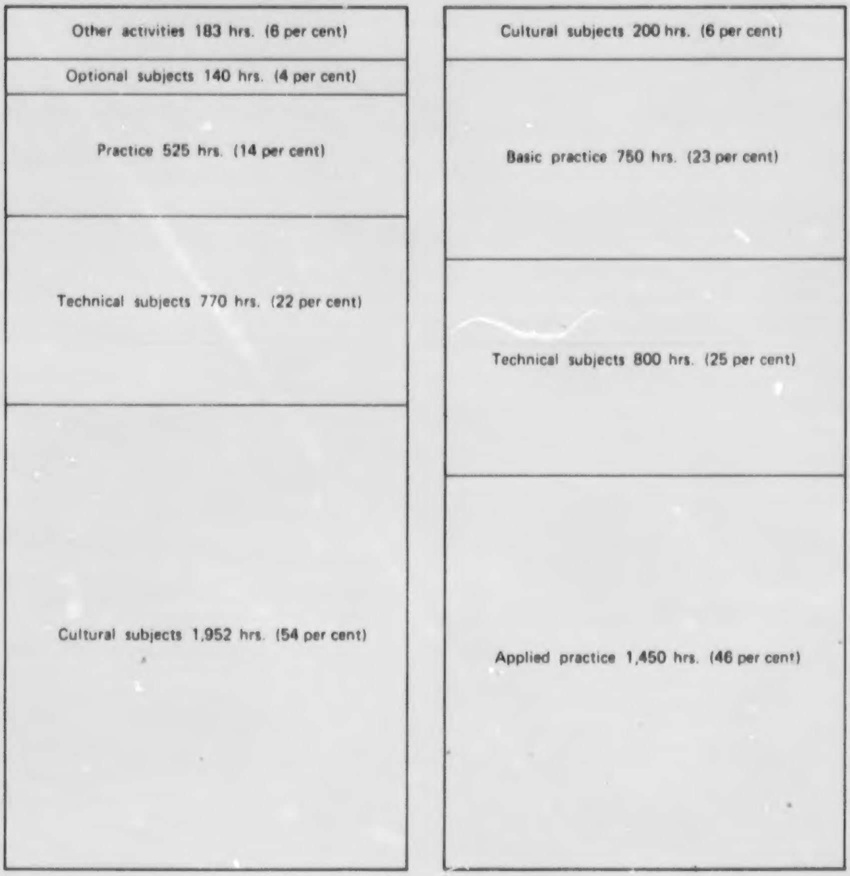
According to the course of study, local school curricula both for students in the general courses and in the specialized vocational courses must provide instruction in the following subjects (a minimum of 80 credits is required for graduation from upper secondary school). Some subjects are required and some are elective.

All students	– Japanese language; Modern society; Mathematics I; Science I; Health and Physical education; One of the following subjects: Music I; Fine arts I; Handicraft I; or Calligraphy I
Female students only	– General Homemaking

Specialized vocational courses only (Vocational education courses) – A specialized subject (not less than 30 credits)

In addition to the above subject requirements, schools must provide for each grade not less than one period per week of home-room activities and club activities, as special curricular activities.

Table 3. Comparison between vocational training and vocational education in senior high schools

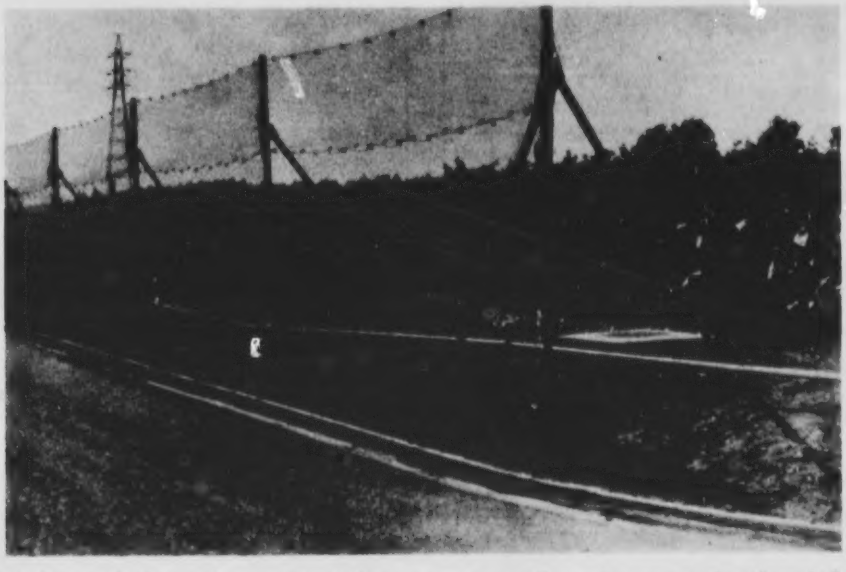


Senior high school machine course
3 years; 3,570 hours

Vocational training machine course
2 years; 3,200 hours

Co-ordinating vocational training with school education

Vocational training is so constituted as to let trainees acquire fundamental knowledge and skills by means of systematic training. The school education system is also required to adapt to contemporary industrial reality by enabling students to develop intellectual faculties applicable to vocational activities in various sectors. Thus school education and vocational training are differentiated, and yet they share something in common at the same time. In an attempt to co-ordinate the two, a more effective system has been introduced to lighten the burden for those vocational trainees who at the same time attend classes in upper secondary schools on either a part-time or correspondence system, and accordingly receive some identical instruction several times. Since 1962, a part of the instruction given at training facilities designated by the Ministry of Education, Science and Culture, is regarded as equivalent to completion of the corresponding part of the upper secondary school curricula. When this system was initiated the designation was limited to those training facilities in which the training period was over three years. Accordingly, the co-ordination policy concentrated on vocational training in outside enterprises. Relevant laws and ordinances were amended in 1967 for a wider application of this measure. The problem of co-ordination of vocational training with school education is expected to be improved by the revised course of study.



A fence of thin nylon netting helps to prevent soil erosion caused by the wind.

Bulletin of the Unesco Regional Office
for Education in Asia and Oceania
Number 21, June 1980

NEPAL

by P. Basnyat

Introduction

Traditional apprentice training, which is an informal type of vocational education, has existed for centuries in Nepal and still exists among artisans. It is in this way that skills or crafts are transmitted from one generation to another.

The formal type of technical and vocational education programme has on the other hand a very short history. The very first technical institution, called the Technical School, was established at Kathmandu in 1932. Programmes for training skilled workers in a few trades such as spinning, weaving, dyeing and agriculture were organized in this school. An engineering section was started in the Technical School in 1941, training about ten students a year at sub-overseer level. Development activities during that time being virtually non-existent, the need for technical education was simply not recognized.

On the recommendation of the Nepal National Education Planning Commission of 1955, multi-purpose education was introduced in secondary schools in 1961 to produce low-level technical and vocational manpower. This programme was run in only a few secondary schools, and was handicapped due to constraints such as lack of equipment and materials, inadequately skilled teachers, improper selection of trades, and no placement service for school graduates.

In 1962, Unesco studied technical education and its problems in Nepal, and recommended the extension of technical training institutes. One of the main bottlenecks in the implementation of the First Five-Year Plan (1962-1967) was the very high priority accorded to technical training. Consequently, agreements were made with countries such as India, the United States of America, Switzerland, and the Federal Republic of Germany for the establishment of technical-education and skill-training centres. In this way, many technical-training programmes were launched by different Ministries to produce technical manpower in order to fulfil specific developmental needs. Meanwhile, a multiplicity of donors and supporters established training centres with their own independent training policies, resulting in considerable disuniformity and discrepancies in the field of technical education and training.

At the onset of the New Education System Plan (NESP) in 1971, the multi-purpose education programme at secondary level was replaced by a new vocational-education programme introduced in vocational secondary schools. In line with the target of the Fifth Five-Year Plan (1976–80) to train 60 per cent of the total number of secondary students in a vocational stream, there are 116 vocational secondary schools out of 569 secondary schools at present throughout the country. These vocational secondary schools (grades VIII to X) aim to prepare students for gainful employment as well as for higher education in the technical field.

The technical training programme at post-secondary level undertaken by different Ministries was reorganized in technical institutes and placed under the umbrella of the Tribhuvan University in the New Education Plan, 1971. However, there are other governmental agencies such as the Civil Aviation and Surveying Departments still running technical training programmes themselves to meet the requirements of technicians in their respective areas.

Some of the technical institutes at Tribhuvan University also run short-term skill-training programmes for mature people with low academic attainment, to produce semi-skilled manpower. Short-term skill training is usually imparted by training centres under the Department of Labour and the Department of Cottage Industry. An Apprentice Act passed by the Government now obliges all factories in Nepal to provide training facilities for several apprentices a year in the related trades.

Expansion of technical and vocational education

Statistics demonstrate significant increases in the enrolment of students at the vocational and technical levels. As shown in Table 1 on page 110, student enrolment in the vocational stream has risen from 10.29 per cent to 26.79 per cent between 1975 and 1977. However, it is still below the target of the Fifth Five-Year Plan (1976–1980), which is to raise the enrolment of vocational students to 60 per cent. At present 16 vocational/occupational subjects are offered at secondary level out of 35 vocations/occupations stated in the NESP, 1971. These subjects are agronomy, horticulture, poultry, animal husbandry and dairy science, fishery, electrical installation, furniture and cabinet making, metal work, cane and bamboo work, building construction, clothing and tailoring, food technology, shorthand and typing, accounting, office management and education.

At the post-secondary level (see Table 2), the ratio of student enrolments in five technical institutes of Tribhuvan University has risen from 6.52 per cent to 16.99 from 1973 to 1977. The five types of technical

institutes are: (1) Institute of Medicine, (2) Institute of Forestry, (3) Institute of Agriculture and Animal Science, (4) Institute of Engineering, and (5) Institute of Applied Science and Technology. Students enrolled in trade/craft-level training conducted by these five technical institutes to produce low-level manpower are also included in the given data.

Apart from the vocational and technical education programmes run by the Ministry of Education and the technical institutes affiliated to Tribhuvan University, there are three skill-training centres under the Department of Cottage Industry and two in-service training centres, run by the Department of Civil Aviation and the Department of Surveying to produce low- as well as middle-level manpower. The cumulative enrolment in these five training centres/institutes is 300 a year, with little variation in the last five years.

With a view to fulfilling the low-level manpower needs of the country, the National Education Committee (NEC) has planned to establish 15 technical (trade) schools during the Sixth Five-Year Plan (1980-1985). These technical schools (TS) will aim primarily to fulfil the developmental requirements of the area where the school is located.

Table 1. Student enrolment in vocational education at the secondary level

Academic particulars	Years 1973	1974	1975	1976	1977
Total number of students in vocational education	-	-	6 311	13 441	19 843
Total number of secondary students	55 312	58 847	61 325	67 214	74 060
Percentage of vocational students	-	-	10.29	19.99	26.79
Number of vocational subjects offered	13	13	13	15	16

Source: Planning Division, Ministry of Education, HMG Nepal.

Table 2. Student enrolment in technical education at post-secondary level

Academic particulars	Years 1973	1974	1975	1976	1977
Total number of students in technical education	1 123	2 142	2 603	2 403	3 650
Total number of students in higher education	17 211	19 597	21 760	23 504	21 477
Percentage of technical students	6.52	10.93	11.96	10.22	16.99

Source: Planning Division, Ministry of Education, HMG Nepal.

Planning of technical and vocational education

There is no single governmental or non-governmental agency responsible for the overall planning and programming of technical and vocational education in Nepal. The technical education programme at post-secondary level is mostly taken care of by the technical institutes of Tribhuvan University. Besides this, the Civil Aviation and Surveying Departments also conduct technician training to fulfil their departmental needs.

The vocational education programme for producing basic technical/vocational manpower is undertaken by the Ministry of Education. The proposed technical school programme (trade or craft type) has been planned and programmed by the National Education Committee with the assistance of some donor countries. The skill training programme (also trade or craft) for producing low-level technical manpower is undertaken by the Department of Labour, the Department of Cottage Industry and some of the technical institutes at Tribhuvan University.

In spite of the Government and government-aided agencies involved in planning and imparting technical and vocational education in the country, the prior sanction from the Manpower Division of the National Planning Commission (NPC) is of prime importance.

The educational programme has a direct effect on economic development because it increases the productivity of manpower. If educational facilities are not provided at par with the country's manpower needs, serious discrepancies may result. It is proper therefore that, in a developing country, manpower assessment should accompany educational planning if not precede it. In the case of Nepal, the NESP for 1971-76 tried for the first time to articulate educational development with the manpower needs of the country. The manpower estimates were at the global level only.

The premises for the manpower assessment were as follows:

1. Nepal's national income will go up 20 per cent in the next five years.
2. The attrition in existing manpower will be at an annual rate of 5 per cent.
3. The need for highly skilled manpower will be twice the growth-rate of the national income.
4. The middle-level manpower requirement will be 30 per cent more than that of the higher manpower requirement, whereas the low-level manpower requirement will be twice that of the middle-level manpower requirement.[1]

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[1] Ministry of Education, National Education System Plan for 1971-76, Kathmandu, 1971, p. 74.

Table 3. Demand for manpower during current Five-Year Plan (1975/76 – 1979/80)

Category		Estimated stock of manpower in 1974/1975	Additional manpower demand during current Five-Year Plan
High-level manpower	Total:	4 348	2 626
Technical group		1 994	1 496
Administrative group		2 354	1 130
Middle-level manpower	Total:	5 979	6 439
Technical group		1 820	4 179
Administrative group		4 159	2 260
Low-level manpower	Total:	18 118*	14 728
Technical group		3 091*	7 948
Administrative group		15 027	6 780
	Total:	28 445*	23 793

Source: Manpower Division, National Planning Commission.

Note: Provisional figures, subject to modifications.

* Data for the mechanic, electrician, etc., group not being available, these figures are incomplete.

Considering the demand for additional technical manpower during the current Five-Year Plan (as illustrated in Table 3), His Majesty's Government has increased the number of students in the vocational stream (Table 1) and the technical stream (Table 2) significantly during the past five years. Prior to the Fifth Five-Year Plan (1975/76–1979/80), only low-level and middle-level vocational/technical manpower was produced in the country. In order to fulfil the demand for high-level technical manpower, promising candidates were sent abroad for advanced studies. In the current Five-Year Plan the Institutes of Medicine, Engineering and Agriculture have started diploma-level programmes (equivalent to baccalaureat degree) to produce medical officers, civil engineers and agriculture officers respectively.

Financing notes

The financial commitment of His Majesty's Government on educational development has increased tremendously since the implementation of NESP in 1971. For example, expenditure of 11.45 per cent of the total national budget on education in 1976/1977 is high in comparison with that in similar developing countries. (A major portion of the educational budget is spent on teachers' salaries and allowances).

The allocation of government funds for vocational and technical education is comparatively more than in general education, but still not sufficient. In addition to the above-mentioned recurring expenditure, schools are provided with workshop buildings and necessary equipment.

In the case of training centres and institutes of technical education, almost all institutions were established through the assistance of friendly countries. The recurring cost in the institutions run by the Departments of His Majesty's Government are fully realized by the Government. In the Institute of Technical Education under Tribhuvan University (TU), the Government is providing 72.6 per cent of the total expenditure (Table 4), and TU has allocated 47.8 per cent of its total budget for technical education.

Table 4. Budget of Tribhuvan University for 1978/79

	Amount (Rupees)*	Percentage
Expenditure		
For Technical Institutes*	61 603 225	47.8
For other institutes	40 370 171	31.3
For Research Institutes	5 154 200	4.0
Others	21 840 404	16.9
TOTAL	128 968 000	100.0
Income		
University's internal income	11 504 000	8.9
Government support	93 699 000	72.6
Foreign aid	23 765 000	18.5
TOTAL	128 968 000	100.0

Source: Tribhuvan University. Budget estimation for Fiscal Year 1978/79, p.5.

* Budget for Institutes of Education is also included. (Approximately 11.90 rupees = one US dollar).

Structure of educational system

School education in Nepal is divided into three levels: primary (grades I to III), lower-secondary (grades IV to VI) and secondary (grades VIII to X). Tertiary education consists of four levels: certificate (grades XI and XII); diploma (grades XIII and XIV or equivalent to bachelor's degree); degree (grades XV and XVI) or equivalent to master's degree; and research.

The orientation and exploration of several vocations as pre-vocational subjects are initiated in grades VI and VII at the lower-secondary level. A trade programme for the needy student who has completed primary education or dropped out of lower-secondary school, is proposed to produce semi-skilled workers.

The vocational education and skill training programme are introduced at secondary level. The minimum academic requirement of the trainee for vocational education in vocational secondary school is grade VII, while in the skill training programme it varies from grade VII to grade X completed according to the area of skill training. The duration of the training programme also varies. A trade-school programme (secondary level) is also proposed for the forthcoming Sixth Five-Year Plan to produce skilled workmen.

The technical education programme is introduced at post-secondary level to train technicians for different fields of developmental work. The minimum academic qualification required for entrance and duration of training is grade X or School Leaving Certificate (S.L.C.) and two or two-and-one-half years respectively. Qualified technicians having successfully completed and passed the technician course or certificate in technical education are eligible for admission to the diploma-level course or advanced studies.

Preparation and supply of teachers/instructors

The successful implementation of a technical/vocational training programme is mainly dependent upon the ability, potential and efforts of teachers/instructors. With a shortage of technical manpower, and due to the fact that teaching is a lustreless profession in the country, it was a problem to get good vocational and technical teachers in sufficient numbers. After the onset of NESP in 1971, the need for vocational teachers increased sharply, and to fulfil this demand the Institute of Education, Sano Thimi Campus, started to train vocational teachers. The student teachers achieve technical training along with knowledge in pedagogy during the training period.

Most of the teachers/instructors serving in the institutes of technical education had their technical training abroad, and were given knowledge and experience in pedagogy through short-term in-service training in the respective institutes. In the case of instructors serving in skill-training centres, most were trained in the same institute in Nepal and some were also sent abroad for further enrichment in knowledge and practical skills.

Recruitment. The staff of institutes of technical education are employees of the Tribhuvan University. The instructors working in the skill training centres run by the Departments of His Majesty's Government are civil servants, while the vocational teachers working in secondary schools are employees of the different District Education Committees (DEC).

Qualifications. The vocational teachers at secondary schools should hold a Diploma in Education (equivalent to baccalaureat degree) in the respective areas of teaching. The minimum qualification required for a lecturer in an institute of technical education is a bachelor's degree in the relevant subjects. The certificate holders are recruited as junior instructors in these institutes. In the skill-training centres the instructors are certificate holders (two to three years' training after S.L.C.) or have completed the trade course from the same centres or institutes.

Teacher/instructor training. There are two types of training programmes organized for teachers/instructors of technical/vocational institutes. These are pedagogy training, and advanced training in the same specialization area.

The lecturers and instructors of technical institutes are generally professionals and technicians.[2] Thus pedagogy training is of utmost importance for such personnel to make them well-equipped technical teachers. Instructors of skill-training centres are also technicians or craftsmen by training, and some technical institutes and skill-training centres organize short-term training in pedagogy during vacations. Instructors are sent abroad for advanced training in their fields of specialization. The vocational teachers of secondary schools, who are all trained teachers, are given opportunities to participate in short-term workshops and training to keep abreast with new techniques and developments in the field of education.

A guidance and counselling programme has not yet been introduced in the technical/vocational schools and institutes in Nepal. Its importance and necessity has been felt and positive thinking towards its establishment is under way.

Physical facilities

Most of the technical institutes and skill training centres are furnished with the necessary workshop buildings and equipment. Some institutes are supplied with sufficient materials to continue practical activity as long as needed, but some have difficulties in materials supply, which constricts the development of trainees' skills to the desired norm. The secondary schools are provided with a workshop building and equipment for the teaching of vocational subjects. Although almost all the main school buildings are constructed with the local peoples' participation, the total amount of money spent by His Majesty's Government on workshop buildings and equipment is high. As the number of secondary schools is large, however, the share of money each school gets is meagre. The funds available for workshop construction and the buying of equipment is therefore insufficient and as the classes are large, they are generally not adequately

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2. Doctors, engineers, agriculture graduates etc., with at least baccalaureat degree.

equipped. The supply of materials for practical activities is also a burning issue. The vocational schools are provided with 25 per cent of the total teachers' salaries for the purchase of educational materials. Nevertheless, the practical activity in most of the vocational secondary schools is not carried out as much as needed. As a result, the development of employable skills in the students falls short of the mark.

Planning and development of curriculum

The curricula of vocational education at secondary level are planned and implemented by the Ministry of Education. There are, however, considerable variations in the curricula of technical education at post-secondary level because several agencies are conducting the programme. For the same reason there are discrepancies in the curricula of the skill training programme at trade/craft level.

Objectives of the curriculum. The main objectives of vocational education in the vocational high schools (VHS) are:

1. To develop occupational knowledge and proficiencies for entrance employment as technicians such as overseer, ranger, junior technician in agriculture or nurse who can direct the work of low-level manpower.
2. To develop desirable attitudes, appreciation and aptitudes towards various occupations and to develop active and productive members of the community.

The main objectives of technical education at post-secondary (certificate) level at the Institutes of Engineering, Forestry, Agriculture and Medicine are:

1. To develop occupational knowledge and proficiencies for entrance employment as technicians such as overseer, ranger, junior technician in agriculture, nurse etc., who can direct the work of low-level manpower.
2. To prepare trainees for subsequent higher training in the country or abroad.[3]

The objectives of the skill training institutes and technical institutes which provide short- or long-term skill training for low-level technical/vocational manpower are to develop occupational knowledge and skill for entrance employment as a semi-skilled [4] and skilled worker [5] at trade or craft level.

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[3] Institute of Engineering, Institute of Agriculture and Institute of Medicine are running diploma-level training (equivalent to baccalaureat degree from a college or university) in the areas of civil engineering, general agriculture and general medicine respectively.

Occupational areas. Out of 35 different vocational subjects stated in NESP, 1971, there are 16 vocational subjects in operation in the 116 vocational secondary schools at the moment. These can be placed under five headings as follows:

Agriculture : agronomy, horticulture, poultry, animal husbandry and dairy science, and fishery.
Industrial education : electrical installation, furniture and cabinet making, metal work, building construction, cane and bamboo work.
Business education : shorthand and typing, accounting and office management
Home science : clothing and knitting, food and nutrition
Education : education [6]

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[4] Such as carpenter, mason, junior technical assistant in agriculture, assistant midwife, auxiliary health worker or forester.

[5] Such as electrician, automechanic, general mechanic or fitter.

[6] Education is also one of the vocational subjects offered in secondary school to produce primary school teachers.

Of the five types of Technical Institutes (TI) in Nepal, all except the Institute of Forestry have more than one campus located in different parts of Nepal. The occupational areas offered in the TIs are as follows:

1. Institute of Engineering: civil engineering majoring in road-building or water supply; electrical engineering; architectural drafting; quantity surveying; mechanical engineering and automechanics.
2. Institute of Agriculture and Animal Science: general agriculture; agricultural extension; agricultural engineering; plant protection; soil and water management; animal science; veterinary science; dairy science and fishery science.
3. Institute of Forestry: general forestry.
4. Institute of Medicine: ayurvedic medicine, general medicine, nursing, laboratory technician.
5. Institute of Applied Science and Technology: chemical technician and laboratory technician.
6. Civil Aviation Training Centre: radio technician and air traffic controller.
7. Surveying Training Centre: surveying.

There are several skill training centres/institutes, located mostly in the Kathmandu Valley and *terai* region. Some of the technical institutes such as the Institute of Engineering, Institute of Medicine, and Institute of Agriculture and Animal Science also conduct craft-level training, and some private institutes offer training for secretarial jobs. The occupational areas are as follows:

1. Skill Training Institutes: general mechanic and fitter, welding, plumber, carpenter, sheet metal worker, auto-mechanic, electrician, junior surveyor, basketry, hosiery, carpet weaving and ceramics.
2. Technical Institutes: junior technical assistant, assistant nurse and midwife, carpenter, mason and auxiliary health worker.
3. Private Institutes: typing and shorthand for office secretaries, tailoring and knitting.
4. Training Centre for Tourism and Hotel Management: tourist guide, costs, catering and the like.

Weightage. In the vocational high schools the weightage allocated for vocational subjects and general subjects is 44.4 per cent to 55.6 per cent, and the relative emphasis on theory and practical activity is 50-50. As one of the major objectives is to prepare students for higher studies in the technical field, more weightage is allocated to general education at the expense of vocational education.

It is proposed that 13 technical schools be established by the NEC during the Sixth Five-Year Plan 1980/81 to 1984/85. The major objective in the proposed schools (trade level) is to produce skilled workers to fill the need for low-level technical manpower for the country's development. Thus 80 per cent of the weightage is allocated to trade education, much of which will be spent on practical activities, although the emphasis will vary for different trades. After three years' study in the technical schools, trainees will be required to go through on-the-job training in development projects, either public or private.

In the skill-training centres, the weightage allocated for trade education is more than 90 per cent in all the institutions; more than three-quarters of the time is spent on practical work. The weightage allocated for technical education in the technical institutes is maximum 90 per cent and the emphasis on the practical aspect varies in different institutions and areas of specialization.

Table 5.Weightage in general and technical education in technical institutes

Institutes	General education (Per cent)	Technical education (Per cent)	Theory (Per cent)	Practical (Per cent)
Engineering	10.0	90.0	(59.3 to (70.8	(40.7 (29.2
Agriculture	12.7	87.3	70.5	29.5
Forest	23.1	76.9	92.7	7.3

To make the technical and vocational programme viable and appropriate to the needs of the localities, the project work in which the trainees are engaged differs for urban and rural areas, although the activities included in the curriculum for male or female trainees are the same.

The relationship of curricula to productive work. In most of the vocational schools, skill-training centres and technical institutes, trainees are required to work on certain projects in order to acquire the desired employable competencies and skills. This work is productive in nature so that the institution may get some economic return from sales.

One skill-training centre puts trainees after the completion of one year's basic course into production work for an apprenticeship of three years. But general education and lectures on trade theory continue mornings and evenings. The trainees or apprentices are under the continuous supervision of a foreman who evaluates them according to their performance on each job.

Innovations and experiments

The concept of technical and vocational education as a formal programme in Nepal is of recent origin. Most new approaches have been adapted from methods tried in several developed countries. Some of these approaches are:

On-the-job training. This is one of the more effective approaches for developing skills, as it allows the trainees to work under actual conditions rather than in the pseudo-situation within the institution. In the Institutes of Medicine, it gives trainees the opportunity to work in hospitals and health centres. This type of training is also practised by the Surveying and Civil Aviation Training Centres. On-the-job training will be required in the proposed technical school during the fourth and last year of the training period.

Apprentice training. This has been practised in Butawal Technical Institute in the Western region of Nepal. There the trainees undergo basic training for the first year and, for next three years, work in the production line as apprentices. After the completion of four years they become skilled workers or craftsmen in their respective trades,

Short-term training for improving abilities. Improvement training is organized occasionally by some institutions. The Institute of Agriculture has a refresher programme to acquaint working junior technical assistants with new techniques developed in the field of agriculture. The Institute of Education, Sano Thimi Campus, also organized an eight-week programme to upgrade local carpenters and masons.

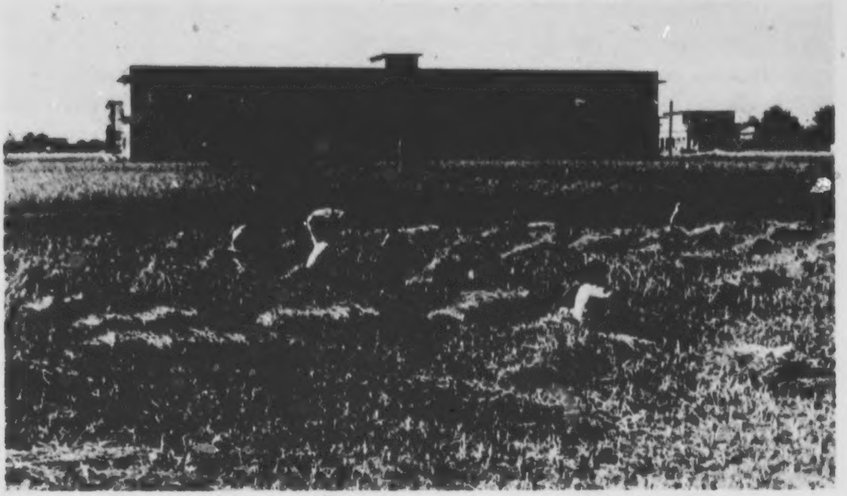
Utilization of local resources and appropriate technology. The proposed technical schools will be established with the aim of fulfilling local needs for the development of the locality. Therefore, the competencies for fulfilling the developmental requirement of the locality using local resources will be developed in the trainees. These schools will be established mostly in the areas where Integrated Rural Development projects will be implemented.

Production of useable or saleable products. Many training centres involve trainees in constructing and developing saleable products to recuperate costs and to develop positive attitudes towards using materials. In the Institute of Agriculture and vocational high schools the trainees raise seasonal crops and vegetables which are consumed in the locality. Carpentry students in some institutions do repair work on the school buildings, furnish the school and fulfil orders to construct furniture.

Earning while learning. This innovative project provides the trainees with an opportunity to earn money while they are acquiring the desired knowledge and manipulative skills. The objectives of the project are:

1. To develop self confidence and positive inclination towards self-entrepreneurship;
2. To increase the level of manipulative skills and proficiency in the area of specialization; and
3. To develop vocational traits and habits and appreciation for the world of work.

This project will be implemented and financed by the schools themselves. The staff and students will contribute and become shareholders. Vocational experts from the Curriculum and Textbook Development Centre, Kathmandu, will supervise the project's implementation.



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Bulletin of the Unesco Regional Office
for Education in Asia and Oceania
Number 21, June 1980

NEW ZEALAND

by Noel Harrison

Introduction

New Zealand has a centrally-controlled national system of education. All children must attend school from the age of 6, but may start at the age of 5. Some attend an intermediate school for two years when they are about 11. Almost all go to secondary school when they are about 13 and stay for two to five years. They must remain until they are 15. Primary and secondary education are free.

Most students finish their secondary education at about 16. Some continue for another year or two to gain more academic qualifications which allow them to be accepted for university or teacher-training courses, or to gain jobs which demand high entry qualifications. About 20 per cent of school leavers go on to some form of further full-time education or training at technical institutes, universities, or teachers' colleges.

More than one-quarter of New Zealand's population are full-time students at a public educational institution. About one-third of all people in the country attend educational classes either part-time or full-time.

New Zealand's system of technical and vocational education grew from the urgent needs of the early European pioneers to gain new skills, to co-operate as communities, and to use their collective experience. The central government was asked to help, usually to solve an immediate problem or support a particular project. Over the years the system has grown, with considerable overlapping functions between secondary schools, voluntary bodies such as the Workers' Educational Association and University Extension courses, the universities themselves, and technical institutes and community colleges.

The Department of Education has had an extremely important national responsibility. It has never, however, tried to impose complete authority over the whole system. Local committees and boards of governors and councils all have their own areas of responsibilities. Universities are regulated by their own Act of Parliament and have much freedom, even though almost all their cash grants come from central government. Technical institutes and community colleges have their own councils, receive all their finance from government, and have asked for greater freedom to develop and start courses. The councils represent groups within the community such as trade unions, employers, women, professional associations and teachers. Within guidelines set by the government they can fix priorities, particularly for development, and reflect local and regional educational needs.

The institutes and community colleges have their own national organization, the Technical Institutes Association. Through this they discuss national policies with the Department of Education and so take part in making decisions. Tutors in technical institutes and community colleges also have their own organization, the Association of Teachers in Technical Institutes. This is directly interested in conditions of service, but also contributes to educational policies in relation to curriculum development and teacher training.

The government also set up, in 1970, a Vocational Training Council to work closely with major industries, to set up training boards (now 26), to help discover new needs, to forecast changes, and to carry out research.

National system of technical and vocational education

New Zealand's system of technical and vocational education offers a very wide range of learning opportunities. Because of its slow process of growth some parts of the system overlap and there is some duplication. The main institutions or agencies are:

Technical institutes and community colleges (17), which provide the greatest range of occupational training courses and adult educational opportunities, particularly for middle-level technical manpower and skilled and semi-skilled workers; with about 5,000 full-time students, and about 120,000 part-time students;

Universities (seven, including one which arranges all courses for extramural students), with about 30,000 full-time students, and about 17,000 part-time students; most courses relate to specific occupational areas such as engineering, law, medicine, commerce, agriculture, architecture, dentistry and education;

Teachers' colleges (six) with about 6,000 full-time students;

Government departments, a number of which carry out their own training programmes; some in co-operation with technical institutes and community colleges (such as the Ministry of Works), and some on their own (Police, Forestry);

Private companies which provide on-the-job training, often with technical institutes or community colleges;

Public hospitals, in which training is still given to most nurses taking three-year full-time training programmes (six technical institutes now also provide such courses);

Secondary schools, which may offer preparatory courses in technical subjects such as woodwork and metalwork, or commercial subjects (book-keeping and typing), and academic subjects which allow students to enter vocational courses in universities and teachers' colleges (mathematics, sciences, English and other languages); and which offer evening or part-time courses in academic, vocational or community education for those who have left school;

New Zealand Correspondence School, first started for children unable to attend day schools and which now has a majority of adult students wishing to gain secondary school qualifications and so go on to further education or into jobs which require such qualifications;

Voluntary organizations within the community, such as the Workers' Educational Association, which arrange part-time courses or seminars in a very wide range of subjects (vocational and non-vocational).

Expansion of technical and vocational education

Since 1960, when new policies were introduced, there has been very rapid growth of technical institutes and community colleges. Recent statistics show that the number of these institutions increased by 200 per cent from 1966 to 1977. In recent years the growth has continued in spite of increased economic difficulties. In 1975, for example, the number of full-time tutors was just over 1,600. In 1978 it had grown by 25 per cent to 2,000. There has also been an increasing growth in more advanced teaching. In 1966 only 13 per cent of the workload of the institutes was in more advanced teaching; by 1978 this was 23 per cent of a much bigger workload. Technical institutes and community colleges are growing faster than universities or teachers' colleges, and there is a fair chance that they will grow even faster than the estimated increase. Table 1 gives the roll numbers in detail for the continuing education institutions for the period from 1970 to 1977. The costs of technical and vocational education are given in Table 2.

Manpower planning

Manpower planning is based on 'educated guesswork', supported by basic information on current trends. The Department of Labour carries out surveys, analyses economic trends, and keeps records of the educational and vocational standards of the people. The Education Department works closely with Labour, and tries to regulate the size of courses in technical institutes in order to match the expected number of trained workers. Sudden changes in the economy can affect, for example, the construction industry, and so reduce or increase the demand for skilled workers.

Table 1. Enrolments at educational institutions 1970, 1976, 1977

Type of institution	1970	1976	1977
Continuing education –			
Technical Correspondence Institute	15 203	21 712	22 022
Other technical institutes			
Full-time students	1 882	4 260	4 729
Part-time students	28 001	35 151	31 801
Technical classes at other institutions			
Full-time students	-	253	217
Part-time students	58 208	62 497	64 688
	103 294	123 873	123 457
Teacher training –			
Teachers' colleges	8 709	7 521	6 837
Kindergarten training centres	321	-	-
	9 030	7 521	6 837
University institutions –			
Full-time internal students	23 323	28 374	29 130
Part-time internal students	8 585	11 522	11 719
Extra-mural students	2 538	6 311	6 857
Agricultural short courses	280	173	212
Medical short courses	43	40	18
	34 769	46 420	47 936

Institutes also keep very close links with the occupational areas they serve. They limit the number of full-time students enrolling for courses of from one to three years' duration if the graduates of these courses are not likely to find work easily. Apprentice training is less a problem for the institutes because it is linked directly to the numbers accepted by employers. In hard times this can lead to some redundancy of staff but in normal times it prevents any over-supply of trained workers. Reduction in the number of trainees during times of economic difficulty can, however, lead to serious shortages of skilled people when the economy improves.

The Vocational Training Council and its 26 industrial training boards is considered by the Education Department to be a main source of advice on future manpower needs because of its closeness to the workplace.

Table 2. Financing of technical and vocational education*
(in thousands of New Zealand dollars)

	1979-80			1978-79	
	Personnel	Other charges	Total	Voted	Expended
Continuing Education –					
University education	–	137 810	137 810	134 775	135 102
Teacher training –					
Pre-service training	46 710	3 000	49 710	50 650	50 836
In-service training	2 180	980	3 160	3 610	3 141
Senior technical and community education	43 650	19 030	62 680	57 800	56 492
	92 540	160 820	253 360	246 835	245 571
Education buildings –					
Universities	–	24 390	24 390	26 000	24 694
Teachers' colleges	–	2 500	2 500	4 500	3 798
Technical institutes/ community colleges	–	10 000	10 000	11 500	10 515

* From the 1979–80 budget estimates for the Department of Education.

A number of co-ordinating committees have the responsibility for ensuring that universities and technical institutes do not offer the same courses. These function at local and national levels. The main group with general responsibility is the Standing Committee on Relationships in Tertiary Education.

Teacher supply and training

Most teachers in technical institutes and community colleges (total: about 2,000) are recruited after they have had a number of years' practical experience related to their special subject areas. Such practical experience is very important because most training courses are linked very closely to on-the-job activities. Academic qualifications are necessary for many courses, particularly at technician level. About 40 per cent of all technical institute training is, however, at apprentice level, and trade experience is therefore more valuable than academic knowledge. Recruitment is difficult in certain subjects such as accountancy and management, and in some of the newer areas involving high technology. Institutes are then permitted to recruit teachers from other countries.

Most new tutors have received no training as teachers before they are appointed. Each one is given a short induction programme, lasting from a week to three or four weeks. The new tutor's teaching duties during the first year are only 90 per cent of a full workload, to allow more time to prepare and to watch other tutors. Heads of departments and colleagues give as much help as they can. A few large institutes now have basic teaching resource centres, and sometimes have been able to appoint one specialist tutor who helps new staff. Each new tutor must attend the national Tutor Training Unit for three separate four-week training sessions in the principles and practices of teaching. These courses must be completed in the first two years after appointment.

In-service training. The Education Department offers a wide range of in-service courses. Some are just for those in technical and vocational teaching, while others bring tutors from different parts of the education system to discuss matters of common interest. Recent vocational education courses have been held on internal assessment techniques, on health-related courses, student counselling, mathematics, and the administration of institutes and community colleges. Refresher courses are offered in the tutor's own time, and are arranged by the Association of Teachers in Technical Institutes (ATTI) and the Department.

Most technical institutes and community colleges cannot give much in-service training because few resources are given for this by the Education Department. The ATTI wants more chances for tutors to improve their professional competence, and has asked for specially-designed correspondence courses for technical institute tutors, so they can gain more qualifications or teaching skills while remaining within their own institutes.

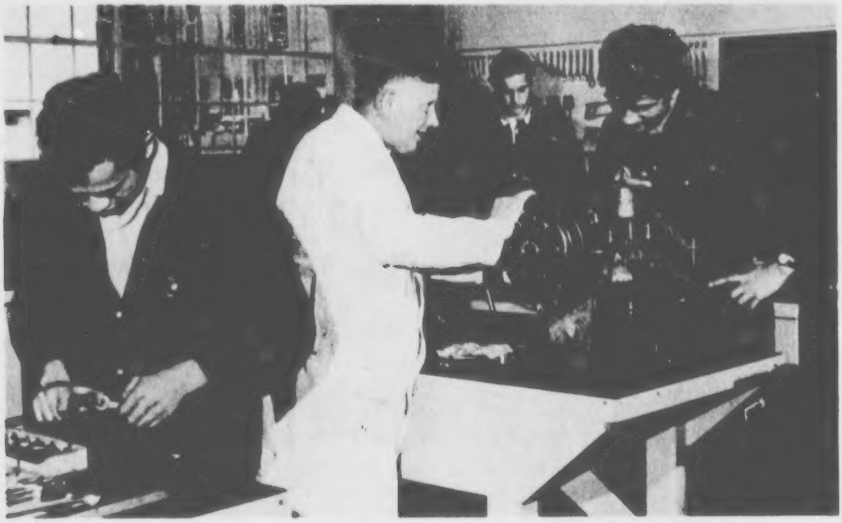
Each tutor may take 12 weeks' refresher leave after five years' service, and then another similar period after ten more years' service. Many tutors feel that this is not enough to enable them to keep up with all the changes taking place in their area of teaching. This system of refresher leave is now being reviewed.

Guidance services. Vocational and careers advice is given to a limited extent in secondary schools. Technical institutes and community colleges appoint liaison tutors who try to ensure that parents, children, teachers and community groups have a clear idea of the opportunities open for further education. Universities have similar liaison officers. The Labour Department has a vocational counselling service for those still at school, and for adults. Schools also arrange some work experience schemes so that those intending to leave have a certain amount of practical knowledge of what jobs are like.

These services are felt by many teachers and parents to be insufficient. School careers advisers have very little time to do their work, and they are not always able to keep up to date with what is happening on the job market. Very little preparation or training is given to teachers holding such positions. Work experience programmes are often provided only for students in non-academic courses. Recommendations for improvements have been made to the Education Department and to the Department of Labour in an attempt to provide better guidance. This has become more urgent as competition for jobs increases with rising unemployment. (More than 50,000 in a total workforce of 1,230,000 are registered unemployed or are on special relief schemes).

Workshops and equipment. When technical institutes were first opened in the 1960s, they were often housed in old secondary school buildings, old houses or community halls. Workshops were not designed for their new function and equipment was usually not modern. In recent years most institutes have been given new buildings and while there is still a strong demand for a greater variety of up-to-date equipment most have at least a reasonable supply. One of the main problems is the changing technology and methods being used in industry. As apprentices and technicians gain most of their experience at work, it is important that institutes have workshops and equipment which are similar to those of the workplace.

As has been shown, the development of technical and vocational education since 1960 has been very fast. Before then most training had been done as part of a job, usually through a system of apprenticeship. Universities gave training at a higher level, and the middle-level technician



Instruction in the overhaul of engines was only being considered as a new type of worker. In the last 18 years universities have expanded their occupational education courses. Technical institutes have grown from one in 1960 to 17 in 1979, with four more senior technical divisions in secondary schools waiting to be promoted to institutes (in the form of community colleges). The main problems involve:

1. Forward planning;
2. Preparation time (on the introduction of new curricula);
3. Evaluation of new and existing courses;
4. Training of those involved in new developments; and
5. Speed of response to changing needs.

Approach to curriculum development

Almost all curricula have developed as a direct response to the needs of industry and commerce for certain skills or a special body of knowledge. Until 1948, when the Trades Certification Board was set up, the traditional form of skills training was through the system of apprenticeship, and was done almost entirely at the work place. After 1948 additional training was given in the adult classes of secondary schools, and then after 1960, in the new technical institutes and community colleges.

Because of the way in which such courses were started the curriculum in each trade or skills area was usually not much more than a list of the skills to be taught or the knowledge to be gained. Curriculum committees included employers, workers and teachers, but in the 1950s and 1960s very few of these had any experience with the techniques of curriculum design. The result of their work was a list of training tasks that was often too long for the period of time allowed. The curricula usually included very little about methods of teaching and learning, or about evaluation techniques. The new teachers of these trade subjects, most of whom were recruited directly from industry because of their valuable practical experience, were not able to receive much help from the institutes themselves.

When technician training was introduced in the 1950s to meet the need for middle-level manpower, many new curricula had to be designed for a large number of new subjects. More thought could have been given at this time to what was needed, the standards to be attained, methods used and systems of evaluation. However the new Technicians Certification Authority had few resources for this sort of careful development of curricula. As the technician courses increased very quickly, curriculum planning and evaluation never gained a high priority. Committees of employers, workers and teachers were set up with the power to review curricula, but revision remained very slow.

Courses of full-time study for one, two, three or four years began in the institutes and community colleges from the early 1960s. Curricula were worked out in great detail with the industry for which students were being prepared. Each institute was, at first, able to develop its own methods and issue its own certificates of achievement. Classes were fairly small and teachers were able to gain a good knowledge of the ability of the students. Training was related very closely to the needs of the industry, and work experience was included in most courses. Evaluation was often done jointly with industry representatives.

In the early years of technical and vocational education, it is fair to say that not enough attention was given to:

1. Analysing the skills or the knowledge needed;
2. Setting behavioural objectives;
3. Working out the best sequences of learning;
4. Integrating technical institute programmes with what happens in the workplace;
5. Developing new and more relevant methods of teaching and learning;
6. Evaluating the learning that was taking place by methods other than examinations;
7. Continuously revising curricula so that they were always up-to-date;
8. The needs of the students, or their potential involvement in evaluation.

In more recent years, more has been done to ensure that curricula are considered more fully, particularly when new subjects are being introduced. A greater number of teachers now have more knowledge and experience of the ways in which curricula can be constructed.

A 1978 report on Technical and Vocational Education, by a committee of the New Zealand National Commission for Unesco, contains a valuable checklist to be considered when curricula are being designed:

a) relevance of curricula to the needs of society as well as the needs of industry;
b) frequency of revision of technical curricula and courses;
c) availability of adequate and continuing tutor training in the learning process;
d) availability of adequate time for tutors in non-class contact situations to design and evaluate curricula;
e) provision of facilities for remedial work with students;
f) availability of supplementary individual study for students in small-group or individual situations;

g) involvement of representatives of industry and commerce in curriculum design;
h) provision of study skills programmes for students.

Emphasis on theory and practice

In New Zealand the main emphasis in all technician and vocational training has always been on practice and work experience. For example, in a three-year period apprentices spend about 25 weeks in technical institute courses of theory. All the rest of the time is spent on practical work, which in some trades is spread over four or five years. Technician trainees can do the first three stages of a course in one year of full-time study in an institute, but the final two stages (each taking a year) can only be done by trainees working full-time in a related occupation.

Heavy emphasis is put on work-based training rather than study in an institute. Also, training within an institute is not all theory; most courses include ample time for practical skills or job-related projects and assignments.

Differences in programmes

Urban-rural. About two out of every three New Zealanders live in urban centres, most of them in five main cities. Ten out of 17 technical institutes and community colleges are in these cities, so most people have easy access to continuing education.

In recent years a number of small institutes and community colleges have been opened in rural areas to give more continuing education

Trainees learning Maori carving

possibilities. These cannot, however, provide all the courses available in a city institute; nor can all the city institutes provide all the courses needed in their area. The reason for this is the relative smallness of New Zealand's population. As a result of this, the Government has decided that national courses will, usually, be located in one institute, the Central Institute of Technology (situated near the capital city, Wellington). The New Zealand Technical Correspondence Institute also helps to provide courses for rural students and others who cannot reach a local or regional institute.

Opportunities for rural people have improved but they still have fewer chances for continuing education than those living in cities. This is not thought to be unfair. Students, and the labour force in New Zealand, have always been very mobile, and have traditionally travelled to places of study and of work.

Male-female. In the past there have been big differences in technical and vocational opportunities for men and women. In recent years, however, a number of laws and regulations on equal pay and on discrimination in employing qualified labour have increased the opportunities for women. Special courses have been held in technical institutes to prepare women to apply for jobs not usually done by women. Institutes have been asked to offer courses at times suitable to mothers with children. Child-care centres have been started. Guidance counsellors are broadening the range of advice to girls and women seeking work or training. More employers are now accepting girls as apprentices.

These changes all reflect new social attitudes, though the speed of change is still considered by many people to be too slow. Opportunities are available for training and for jobs but the great majority of women and girls in the labour force (they make up more than one-third) are still doing jobs traditionally expected of females.

Methods adopted for evaluating curricula

As training is linked very closely with work it is possible at all times to keep a close watch on the progress of trainees. Methods of continuous assessment are now being used in addition to examinations. Employers are also able to see how much is being learned by observing the performance of their trainees. Local and national committees of apprentices and technicians watch over training schemes. The 26 Industry Training Boards of the Vocational Training Council also keep close contact with courses through their own members and through Industry Training Officers. Still, curricular changes are slow in response to changes within industry.

Innovations and experiments

Recently the main innovations in technical and vocational education have been the following:

1. Opening of community colleges in rural areas;
2. Starting of a new form of nurse's training in technical institutes and community colleges;
3. Growth of para-medical courses, mainly in the Central Institute of Technology;
4. Encouragement by the Department of Education of innovative teaching techniques in institutes and colleges;
5. Development of more 'distance education' techniques (radio, correspondence courses, discussion groups, conference telephones);
6. Establishment of resource centres for teachers in technical institutes and community colleges;
7. Broadening of the range of continuing education to include formal and informal activities which support the life of a community (such as adult literacy programmes, public health seminars).

Community colleges. In the last four years three new technical institutes, named community colleges, have opened to serve rural areas and smaller urban centres. Four more are being developed and all should reach community college status in two or three years. These colleges offer the usual trade-commercial vocational courses, and provide full- and part-time technician training when there are sufficient numbers of trainees.

The most important change is the recognition of the broader functions of these colleges to provide for the continuing education needs of their region. They can therefore offer a wide range of courses needed by adults. These include skills and knowledge that could support socially-valuable activities in child care, adult literacy, Maori language, public health education, and voluntary community work. They can also help those experiencing difficulty in finding work. In addition they can help people in rural communities to take advantage of correspondence courses, discussion groups, seminars, workshops and to develop their own learning exchanges (through which people help each other with skills and knowledge). They can support other groups within the community which might need help with their own training programmes. They can work closely with schools so that parents and children can gain a clear idea of the world of work, and of their involvement in community activities. They can work with community radio stations on such issues as water safety, small-business management, language teaching and regional planning.

Most of these activities are potentially possible in larger city institutes, and many are already carried out. Because of their size, however, some large institutes cannot always work so closely with small community groups, and cities already have many other organizations which provide similar courses, such as extension departments of universities, teachers' colleges, the Workers' Educational Association and large voluntary groups.

The value of the new community colleges is that they are able to develop in response to the needs of their own small communities in a very direct way. For example, they can give help to those involved in agriculture, forestry, or horticulture at a very basic level and at the time when it is most needed. Two universities already offer a wide range of courses in agriculture, but for many years very few courses were available in the rural communities themselves. Now it is becoming possible to design basic courses for those wishing to work in primary industry, for those needing special skills, and for those needing knowledge of new systems and techniques.

Nurse's training. Until 1973, the training of nurses was carried out as part of daily hospital work. Training lasted for three years, and study was combined with ordinary nursing duties. From 1973 onward, a number of technical institutes and community colleges began to train students by combining studies within the institutes with planned clinical experiences in hospitals and other health-related agencies. Half the course is study and the other half is clinical experience.

The government has now decided that all nurse's training will be done in this way. The main argument in favour of the change is that nurses need more knowledge and skill today than can be given in the hospital-based training programme. Evaluation studies have been made of the first nurses graduating from the new system, and will continue for a number of years. So far, it is clear that the new nurses finish their training programme with higher academic qualifications, but with less experience of the care of patients and nursing practice. More time must pass before the yearly reviews provide information on the rate of retention within the nursing service, the adaptability of the nurses, and the value that the added knowledge will bring to their work.

Para-medical courses. With the development of the Central Institute of Technology to provide advanced national courses, a number of full-time para-medical courses have been started. Pharmacy was the first of these, and has been followed by such courses as chiropody and physiotherapy.

The growth of this type of training within the technical institute system has led to discussions with universities and the Department of Education, in an attempt to avoid duplication of courses. Questions have also been raised of the type of award, certificate or diploma to be issued.

Innovative teaching projects. In the last few years the Department of Education has encouraged institutes to experiment widely with innovative teaching methods. Teachers are now trying new approaches to

Senior students undergoing training to become dental nurses

mathematics for trade classes, building up self-instructional material, developing computer-based systems of instruction, and making greater use of television cassettes, slide-viewer sets and computers. The Christchurch Technical Institute, actively promoting conservation of natural resources, is involved in the development and implementation of energy audit techniques in non-domestic buildings, and is investigating alternative fuels to coal, such as the pelletization of used paper, and tree foliage. This institute is also investigating the application of micro-processor techniques to agriculture in areas such as irrigation and frost control. The Hawkes Bay Community College is involved in a major project with the New Zealand Commission for the Future, investigating possible developments in its own region, and taking part in a big public education programme in an attempt to make people more conscious of the need to plan their own futures.

'Distance' education. New Zealand has always realized the need for correspondence education, because of the number of people living in rural areas or those who, for other reasons, cannot reach institutes. One university (Massey) provides extra-mural courses for the whole country, and the two major national correspondence institutions provide an excellent coverage at primary, secondary and technical-institute levels. Radio has always been part of that system of 'distance' education, but in recent years a special section has been established for continuing education.

A major report is now being prepared on the development of this system. More emphasis is expected to be given to the use of radio, to the encouragement of discussion groups, to experimenting with 'conference' telephones (in which a large number of people can listen and take part in learning sessions by means of a loudspeaker-telephone system) and to the expanded use of correspondence courses.

More urgency has been given to this approach to learning within the community because of the shortage and rising cost of energy. Travel has become much more costly and it is important, therefore, that as much learning as possible take place near the homes or jobs of the learners.

Resource Centres. Resource centres have been set up in the larger technical institutes, and in all universities, to help improve teaching techniques. In the institute system this is combined with more in-service training courses, in co-operation with the national Tutor Training Unit.

Continuing education. Since the passing of the 1974 Education Act, technical institutes and community colleges have been encouraged to provide a wider range of continuing education opportunities. These are not always directly connected with vocational training, and the sharp lines which have sometimes existed between 'vocational' and 'non-vocational' are now becoming blurred.

One of the main criteria for new courses is their community value, rather than only their personal value to the individual. Courses of this sort give training to those involved in voluntary community work, help with community education programmes, support parent education or child care activities, and help with adult literacy programmes and trade union projects. Some institutes have always offered such courses, but all of them are now being actively encouraged by the department to give greater support to community groups.

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PAKISTAN

by S. Hussain

Introduction

Technical and vocational education was started in the 1950s in a few post-secondary, diploma-level institutions which offered three-year programmes of instruction. These were called polytechnic institutes. Technical education later proliferated into a fully-fledged system and in the last decade various types of institutions, offering trade, commercial, diploma, and degree courses in various technologies, have been established. In addition to this, young persons have for centuries been informally trained in the traditional manner as apprentices under the supervision of master craftsmen. A few vocational training centres have also appeared in the last few years; this has helped to mitigate the shortage of skilled labour.

Short-term evening trade courses and crash programmes to turn out trained manpower are also available. The former were started in larger institutions some years ago and have been offered recently by institutions of medium size. Last year, crash programmes were also started in some institutions, with the aim of producing skilled and semi-skilled workers in the shortest possible time by prolonged daily instruction in various trades.

Commercial education was started simultaneously with other categories of technical education, and includes book-keeping, accountancy, shorthand, typing, economics, and business management. Girls' education also received equal attention, and a large number of industrial schools for girls were opened and old schools refurbished. A Polytechnic Institute for Women was started in the country some years ago.

Simultaneous arrangements were made for the in-service training of various types of teachers, so that a large network of institutions could be provided with adequately-trained staff.

With the exception of informal training, and education and training in private vocational institutions, almost all the above-mentioned activities are being performed under the control of the Department of Technical Education in each province. Labour departments of the provinces are also contributing towards technical education. Their activities are confined to running technical training centres, where various trades are taught, and to training apprentices in industrial enterprises under the Apprenticeship Ordinance.

About two years ago, a programme in agro-technical subjects was introduced in all general secondary schools; in this way some technical orientation is given to students graduating from non-technical schools. Thus a reorientation of ordinary education through the modification of syllabi has been attempted, in order to produce semi-skilled manpower. The decision reflects the attention given to food and agriculture in recent years. A technical teachers' training college has been established at Faisalabad, to produce teachers capable of teaching technical subjects in the schools. Allama Iqbal Open University, in Islamabad, started technical courses at the vocational or trade level in 1979 in order to contribute skilled manpower.

Post-matriculation or post-secondary technical education

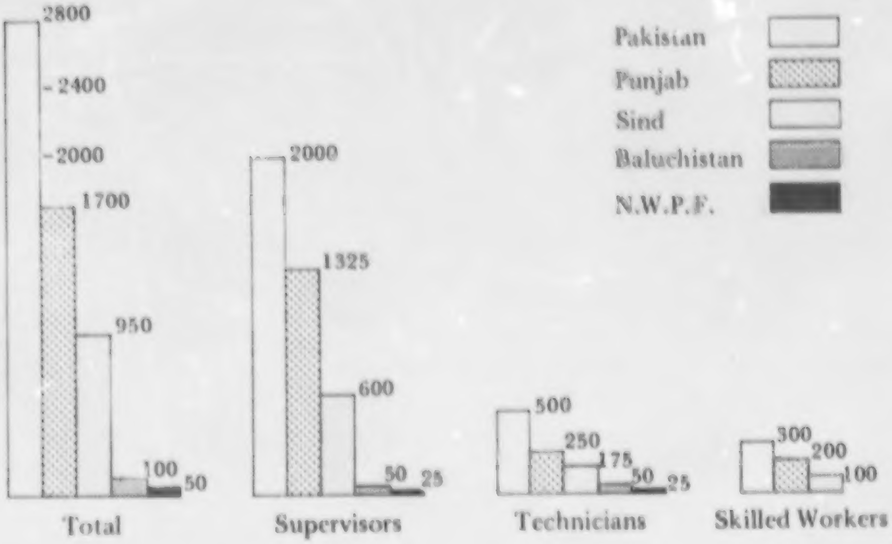
At present, 24 Polytechnic Institutes are offering three-year technical education courses in important technologies. Passing the matriculation examination in physics, chemistry, and elective mathematics is the essential condition of entry into polytechnics. The output of diploma-holders in 1974 was 4,000, and increased to 6,500 in 1978. The main technologies being taught are:

1. Architecture
2. Automobile and diesel technology
3. Automobile and farm machinery technology
4. Civil technology
5. Chemical technology
6. Draughting and designing technology (mechanical)
7. Dress-making and dress-designing technology
8. Electrical technology
9. Foundry technology
10. Machine-shop technology
11. Mechanical technology
12. Metallurgy and welding technology
13. Power technology
14. Public health engineering technology
15. Printing and graphic arts technology
16. Radio and electronics technology
17. Refrigeration and air-conditioning technology
18. Textile technology
19. Television technology
20. Tool design and tool-making technology
21. Watch technology

For the purpose of acquiring advanced knowledge in technology, Bachelor of Technology Pass-and-Honours classes were started three years ago in seven polytechnic institutes, which were upgraded to the level of Colleges of Technology for this purpose.

While the 22 institutions are producing engineering technicians, two of these operate on a slightly different pattern and are producing industrial technicians with a more practical bias. Diploma-holders in this category are usually employed as supervisors, workshop instructors, overseers, subordinate engineers and technicians. A survey conducted in the country in 1976 shows the following pattern of employment of diploma holders:

Polytechnic graduates by type of employment



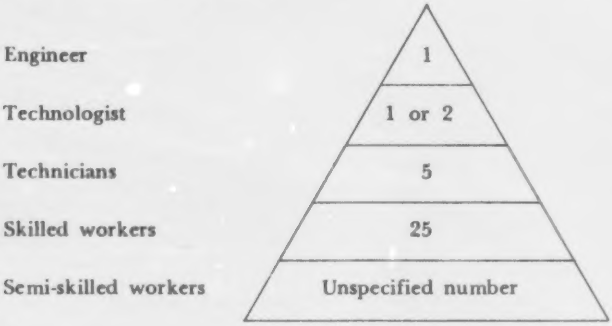
Vocational institutes for boys

Thirteen institutions of this type are at present being run by the government of Punjab and 11 private institutions are functioning in the same province. Approximately an equal number of such institutions are functioning in the rest of the country. The total output of skilled workers from all these institutions has been steadily increasing every year, and exceeded 1,000 in 1978. The trades being taught in these institutions are the following:

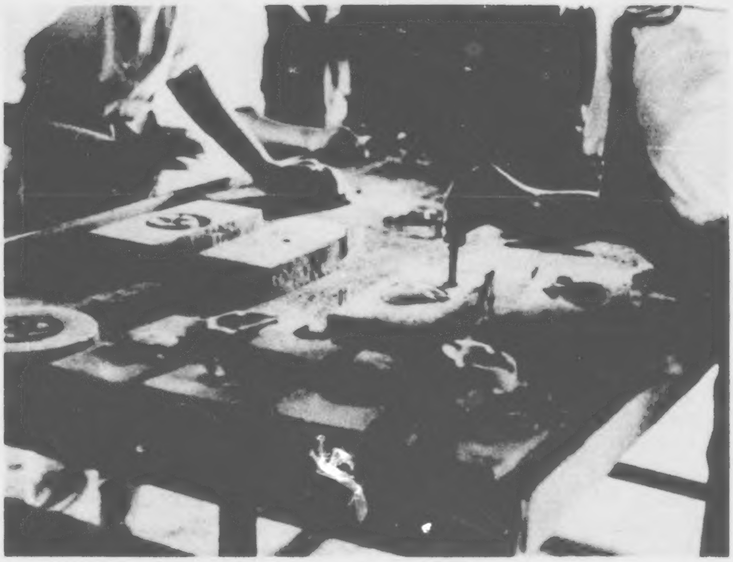
1. Turner
2. Tracer
3. Plumber
4. Pipe-fitter
5. Welder
6. Surveyor
7. Auto and diesel mechanic
8. Building draughtsman
9. Electric winder
10. Die-maker
11. Electrician
12. Furniture and cabinet maker
13. General fitter
14. Mechanical draughtsman
15. Machinist
16. Radio mechanic
17. Sheet-metal worker
18. Refrigeration mechanic

The duration of study is two years, and entry requirements are a grade VIII pass in all cases, except for the trades of electrician, building draughtsman, and mechanical draughtsman. The figures show that the output is very meagre, given the number of institutions. This is partly because a certain percentage of skilled labour requirements are being met from sources mentioned subsequently, and partly because of the apparent desire of most people to rise above the level of physical labour. Some of the polytechnic diploma-holders are also employed as skilled workers, thus decreasing the demand for vocational education. So far these institutions have not been able to attract sufficient enrolment, but in future the demand for trained manpower is likely to rise steeply with the development of the country, and full utilization of vocational education facilities is expected. Of late, the Middle East has been absorbing some of Pakistan's skilled manpower and a shortage is being felt in the country. This is likely to have a healthy effect on enrolment.

Technical education in Pakistan has been planned on the model of a pyramid with a ratio of 25 skilled workers to five technicians, one or two technologists, and one engineer.



It appears that the ideal conditions envisaged have not been achieved, and the base of the pyramid remains short. Efforts are needed not only to



achieve this ratio but to widen the pyramid at the base beyond this ratio, so as to achieve economy and efficiency.

Vocational schools for girls

There are 13 government girls' vocational schools and about 26 private girls' vocational schools functioning in the province of Punjab. The figures for the whole of Pakistan may be obtained on the ratio of 60 per cent for Punjab and 40 per cent for the rest of the country. The total annual output exceeds 3,000 girls. The courses in these institutions include dress-making, embroidery, sewing, and knitting. Diplomas are awarded for courses of two years' duration, while certificates are given for one-year courses. After passing these courses girls are able to earn their livelihood, or alternatively they can use their skill at home to economize on clothes.

A women's polytechnic in Lahore offers commercial courses as well as diplomas in dress-making and in radio and electronics. After passing the commercial courses, girls can seek employment as secretaries. Dress-making and radio electronics diplomas also qualify them for employment.

Commercial institutes

Commerce and industry also need the services of persons who can keep accounts or work as typists, stenographers, or clerks. Commercial education has therefore been made part of technical education and at present 35 commercial institutes are functioning. A one-year course for a Certificate in Commerce and a two-year course for a Diploma in Commerce are given in these institutes. The annual output is about 3,000 graduates, most of whom find employment as clerks, stenographers, steno-typists, and accounts clerks in various organizations.

Training as apprentices in industry

In 1962, an ordinance was promulgated according to which every employer in Pakistan employing five or more persons in an apprenticeable trade, is bound to take a certain number of apprentices for training. An apprentice acquiring training under this programme is paid a stipend by the employer, and the apprentice and employer are bound by contractual agreement. The 60 apprenticeable trades under this scheme are:

Group A–Metal and Mechanical Trades

1. Automobile body builder
2. Blacksmith
3. Boat builder (steel)
4. Boiler-maker
5. Die sinker
6. Jig- and tool-maker
7. Locksmith
8. Machinist
9. Marine engineer
10. Diesel engine mechanic
11. Auto mechanic (diesel)
12. Mechanic (instruments)
13. Mechanic (petrol) motor
14. Mechanic (aircraft)
15. Mechanic (refrigeration)
16. Draughtsman (mechanical)
17. Engraver
18. Fitter (bench)
19. Fitter (engine)
20. Fitter (pipe)
21. Mechanic (typewriters)
22. Millwright
23. Modeller
24. Moulder
25. Sheet-metal worker
26. Shipwright
27. Steel-construction worker
28. Turner
29. Welder (electric and gas)

Group B–Electrical and Electronics Trades

30. Armature winder
31. Battery repairer
32. Cable jointer
33. Electrician (auto)
34. Electrician (aircraft)
35. Electrician (general)
36. Electro-plater
37. Fitter (electrical)
38. Lineman
39. Mechanic (electrical instrument)
40. Radio mechanic
41. Wireless operator

Group C–Woodworking Trades

42. Boat builder (wood)
43. Cabinet maker
44. Carpenter and joiner
45. Pattern maker

Group D–Building Trades

46. Bricklayer
47. Draughtsman (building and roads)
48. Mason
49. Painter and decorator
50. Plasterer
51. Plumber

Group E–Printing Trades

52. Compositor
53. Fitter (printing)
54. Hand pressman
55. Machinist
56. Printer

Group F–Textile Trades

57. Fitter (textile)
58. Supervisor (bleaching)
59. Supervisor (spinning)
60. Supervisor (weaving)

Approximately 75 per cent of the apprentices' working hours are spent on practical work, and the remainder on theoretical instruction. The total number being trained annually in this manner is quite large and increases with the expansion of industry.

Introduction of vocational subjects in general secondary education

Two years ago a component of vocational subjects was introduced into the scheme of studies for secondary schools, and these subjects are now being taught in grades IX and X, in a large number of schools. Although it could not be introduced in all schools simultaneously, due to financial constraints and a shortage of teachers, the scheme will eventually cover all secondary schools in the country. Progress in this case will depend upon the availability of resources.

In-service training of teachers

Four categories of teachers are employed in the technical education departments in Pakistan. These are engineering degree holders, those with an M.A. or M.Sc. degree, diploma holders, and technicians with long experience in their field but no formal qualification from any technical institution. In-service training of teachers is carried out in Rawalpindi and in Karachi, and all teachers must undergo this training, either by short-period modules or by continuous training for one year. The art of pedagogy is taught, as well as relevant technical subjects. The main difficulty in implementing this programme is the shortage of teacher educators in the institutions. Teachers cannot be spared for training except during vacations and to overcome this difficulty a training reserve at 10 per cent of the present strength is proposed to be employed.

Teachers' Training College, Faisalabad. The activities of this College are geared to the requirements of general education. As vocational subjects were introduced in the secondary schools, it became necessary for technically trained teachers to be available before the start of this programme. Hence teachers and those wishing to become teachers in secondary schools obtain training for two years in the technical subjects which they will teach. These subjects fall mainly in the field of industrial arts, and instruction is given up to the level required in secondary education.

Evening extension courses

This programme aims at imparting skill and knowledge to semi-skilled workers in the evenings. Although it was initially started only in the polytechnics and vocational institutes of big towns, it is now running in almost all categories of institutions. It is confined to the skilled-worker level (vocational level) and the duration of the courses varies from six months to one year, depending upon the type of course. In all, 40 trades are being taught under this scheme and these are almost identical with those given in the list of apprenticeship ordinance trades. Semi-skilled and unskilled persons enhance their market value by taking such courses. Theory is taught as well as manual practice.

'Crash' course. This course is similar to the evening extension programme in all respects, except for the duration of the course, which is only three months. As this has been done without curtailing the course contents or duration of trade practice, the number of hours per week had to be increased. In some large towns, quite a number of trades are being taught in the evenings under this programme, thus augmenting production of skilled and semi-skilled manpower. The total output of the evening extension courses is about 10,000 people per year.

Informal training (apprenticeship) and open education

This is a very old practice in which young boys go to master craftsmen to learn the trade. This is done by mutual arrangement between the craftsman and the pupils' fathers or guardians. Such arrangements are not regulated by the government, except insofar as there exist laws against child labour. It is not possible to collect statistics in this area as the practice is prevalent in all big and small towns and villages of the country. It is estimated, however, that this is as large a source of trained manpower as the last two programmes mentioned.

Allama Iqbal Open University. Recently, and with the collaboration of polytechnic and vocational institutes the University started teaching skills by television. Courses are prepared in book form and sent to students, who can work through these at appropriate times by turning on the television. The practicals are arranged in the institutes. A student can learn a trade even if he resides at a place where usual instructional facilities are not available, provided he can come for practicals on fixed dates to the appropriate institution. Figures for output are not yet available.

To summarize, it may be mentioned that although the production of technicians is quite sufficient for the requirements of the country as well as neighbouring areas, the output at vocational or skilled-worker level falls short of demand. The skill imparted also varies from programme to programme, affecting the output of industry qualitatively as well as quantitatively. Main problems encountered in the institutions are the difficulty in maintenance and repair of machinery, lack of aptitude in a large percentage of students, and a shortage of teachers. Possible remedial measures:

1. Staff are being trained in machinery and equipment maintenance. All relevant resources are being used.
2. Student motivation is being stimulated, and encouragement to choose a career in a technology or trade is being given.
3. A suggestion that salaries of teachers be increased has been considered and is now included in the new Education Policy.

Other serious problems which government-run institutions are facing are mostly concerned with rigidity of procedure and red tape. A proposal to provide boards of governors for leading institutions in the Punjab is 'on the anvil'.

Programmes and their objectives

Boards of Technical Education were set up in each province of the country to organize, develop and control technical, vocational and commercial education in Pakistan.

Courses in technologies. Post-secondary courses in technologies listed previously are spread over three years of instructional and practical work. They have been designed to produce engineering technicians who have adequate theoretical knowledge and sufficiently developed practical skills to be successful as supervisory personnel in industry. These technicians are certified as suitable for gainful employment only if they have passed the relevant examinations conducted by the Boards. Special emphasis is given to practical work during the training period, so as to develop sufficient skill in the students. The training is related to actual production, maintenance and repair work so that, if they do not want jobs in industry, enterprising students may set up their own production or repair shops. The most characteristic feature of all these courses is that, apart from technical and science subjects, students are taught industrial management and human relations, business management and accounting, basic psychology and personality development. The object is to give a good general education and to develop in the students qualities that will help them in their future responsibilities in management. The Diploma of Associate Engineer is awarded to students who achieve at least 50 per cent in every subject individually in the examination.

Programme and length of training. All polytechnic institutes remain open for a minimum of 40 hours a week throughout the academic year, which is divided into two semesters of 18-20 weeks' duration.

In the polytechnics, the curriculum in each technology offered leading to the Diploma of Associate Engineer spreads over six semesters in three consecutive years. Students are assessed on the following basis:

1. Sessional work comprising assignments and quizzes, sessional tests and projects/experiments done throughout the semester;
2. A final examination based on all the courses of the semester.

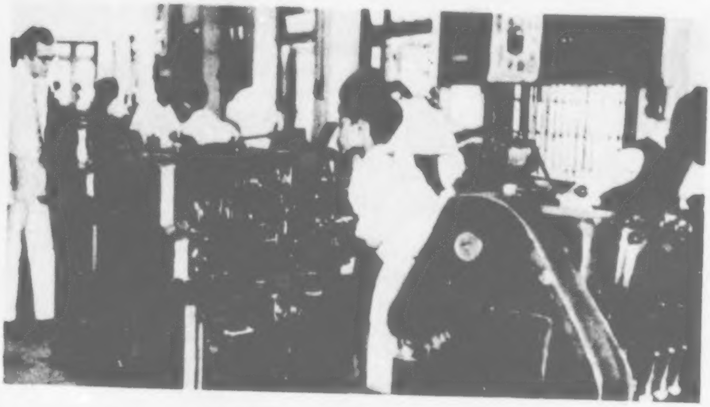
At present, first-, third- and fifth-semester examinations are held by the institutes and second-, fourth- and sixth-semester examinations are conducted by the Board in specified specialized courses. Practical examinations in all the courses are arranged by the institutes.

Attendance. Institutes are bound under prescribed rules to arrange instruction by qualified instructors and other trained personnel in all the courses. Field trips to industries form an integral part of the training programme. Final-year students are also required to go on educational tours of industries and development projects. Students are further required to participate in practical training programmes arranged in industries or government organizations during vacations. To become eligible to take the semester examination, they must attend at least 80 per cent of the theory classes and 80 per cent of the practicals.

Vocational courses. The vocational training course for each trade is spread over a period of two years, each year having 42 effective weeks. Each week is scheduled for 50 periods of 45 minutes' duration. The general objectives of these courses are:

1. To explore and develop the aptitudes needed in the trade;
2. To adjust the trainee, both intellectually and physically, to the industrial environment;
3. To ensure that adequate skills are acquired for the particular trades;

4. To ensure that correct methods are applied in the various operations;
5. To bring efficiency of work and quality of output up to acceptable standards;
6. To impart an appreciation of the importance of maintenance of equipment in order to reduce the risk of machine breakdown;
7. To introduce a general understanding of efficient use of materials and reduction of waste, scrap and refuse in industry;
8. To give information about risks and hazards in the workshops and to introduce safety measures and regulations;
9. To foster the feeling of responsibility, dignity and self-reliance;
10. To develop the ability to work independently and minimize the need for supervision; and
11. To prepare the trainees for gainful employment in the trade.



The scheme of studies has been developed using the principle that the work of technical personnel in the modern industrial enterprise is closely related to scientific and engineering developments which involve the use of new materials, new processes and new methods of production, and that the worker requires a certain ability and skill to perform his functions properly. Such ability includes facility in mathematics, that is, ability to use algebra and trigonometry, and tools that make use of scientific and engineering principles. This involves proficiency in the application of the principles of physical science, including the basic laws of physics and chemistry that are pertinent to individual fields of training. An understanding of the material and processes commonly used in the trade, and communication skills that include the ability to interpret, analyse and transmit facts and ideas graphically, orally and in writing, are equally important.

Girls' vocational courses. The objectives are the same as mentioned for vocational courses. One-year certificate courses and two-year diploma courses are offered at girls' vocational schools, and are limited to dressmaking, sewing, knitting, embroidery, calico printing, toy-making, fancy leather work and fretwork.

Commercial education. The Boards examine students in English, Urdu, Islamiat, Pakistani studies, English and Urdu typewriting, English and Urdu shorthand, secretarial practice, commerce, economics, banking, accountancy and book-keeping in examinations conducted on a yearly basis. The higher examination is also open to university graduates, who can pass this course in one attempt.

On successful completion of one year, students are awarded the Certificate in Commerce by the Boards of Technical Education. After completion of the two-year course, the students get the Diploma in Commerce. This is on the level of the intermediate examination in general education in every respect. Diploma-holders find employment as typists, stenographers, steno-typists, clerks and accountants in various government offices and business organizations. They can also continue their studies to gain a B.A., M.A., B. Com., or M. Com. in industrial accountancy and cost accountancy. Facilities are also available in general education institutions for those having a certificate in commerce. For those already in service, evening classes are available in the form of short courses at various institutions. Examinations in these short courses are also conducted by the Boards.

Vocational subjects in general education. Agro-technical curricula have been revised to capitalize as fully as possible on the human and material resources available in a community. The problem also requires that skills taught in the schools should be in accordance with the needs of the community. Post-secondary education in agriculture includes courses in: general agriculture (compulsory course), farm economics, crop production, livestock farming, animal production, productive insects and fish culture, and horticulture.

At the primary level, effort is being concentrated on (i) the changing of children's attitudes towards manual dexterity and towards those engaged in skilled occupations; (ii) the development in children of motivation and a potential for productive service for the welfare of the community, and (iii) pride in achievement through the creation of useful articles. With these aims in view, the curricula for grades VI to VIII concentrate on basic skills of value both to the child in his or her ensuing adulthood and to the community at large.

The method adopted in achieving these aims is to bring about a complete change in teaching approach. Classrooms are to be used as little as possible and a project approach in a workshop, or in some suitable space, is to be used. The old idea of teaching theory first and following this with practice has been dropped.

After learning vocational subjects in grades IX and X, students should:

1. Have sufficient knowledge of the raw materials, processes, tools and equipment of the chosen vocational subjects to enable them to be employed or self-employed in a related trade;
2. Have developed such attitudes of mind as will enable them to appreciate the value to the individual, to the local community, and Pakistan as a whole, of skilled personnel;
3. Have developed sufficient skill in the practical aspects of the chosen vocational subjects to enable them to be employed or self-employed in a related trade, if required;
4. Have a feeling of self-reliance and self-confidence that will enable them to fully utilize knowledge and skills;
5. Appreciate the necessity of good habits for productivity, craftsmanship, hard-work, punctuality and team spirit;
6. Realize the interdependence of all members of any family, community, or organization;
7. Appreciate the value of the knowledge and skills which have been acquired to their future occupation;
8. Have pride in achievement;
9. Realize that the skills they have learned are useful, even if they acquire higher education and qualify for a profession.

Evening classes at Polytechnic and Vocational Institutes. The programmes are run in the afternoons by competent teachers, and a total of 300 hours over six months are devoted to each trade. Eighty-five per cent of the time is spent on trade practice, while the rest is devoted to theory. The objectives of these classes are:

1. To produce useful citizens out of secondary school dropouts;
2. To produce skilled workers of various trades for the industrial section of the community and the nation;
3. To provide opportunity to employed workers to improve any deficiencies in skills;
4. To enable unemployed youth to obtain gainful employment;
5. To divert the activities of school dropouts into productive and fruitful channels;
6. To introduce modern trends and inventions among the workers already employed.

It should be noted that course outlines have been prepared from the job descriptions of each type of technology and trade, and analysis to determine the relevance of the course outlines reveals that the majority are from 80 to 90 per cent relevant.

Teaching staff

Polytechnic Institutes are staffed by heads of technologies, senior instructors, instructors and junior instructors. Heads of technologies are experienced teachers with the qualifications of B.Sc. (Eng.) or equivalent, as are senior instructors of technical subjects, while senior instructors of related studies such as mathematics, physics and chemistry possess the degrees of M.Sc. in their respective fields. Instructors of related studies also possess the same qualifications while instructors of technical subjects are a mixture of engineering-degree-holders and diploma-holders with long experience (at least four years), either in industry or in teaching. Junior instructors are either diploma-holders of Polytechnics with two years' experience or technicians of expertise with long experience in the concerned technology. While all others teach independent subjects, junior instructors instruct in practicals only or are attached to the teaching staff of other categories.

Vocational Institutes for Boys and Vocational Schools for Girls have a teaching staff consisting of chief trade instructors, trade instructors and junior trade instructors. Qualifications required for chief trade instructors are a diploma from Polytechnic plus four or more years' experience in the technology, with additional experience in trade. Junior trade instructors are required to be experts in their trades. While theory and the conducting of complicated practicals are the responsibility of diploma-holders, instruction in trade practice is also given by others. Subjects of related studies such as mathematics and English are taught by teachers with a degree in the relevant subjects, along with a degree in education.

Commercial Institutes require instructors to hold the degree of M.A. or M. Com. Junior instructors should have a degree of B. Com. and junior instructors of shorthand and typing should possess a diploma in shorthand and typing.

Evening classes in vocations, trades, and theory relating to apprentices under the Apprenticeship Ordinance are also taught by the staff of Polytechnics and Vocational Institutes. In addition to those trained at the Technical Teachers' Training College, Faisalabad, teachers with diplomas from Polytechnic Institutes teach vocational subjects in general secondary education.

In-service teacher training courses must be successfully completed in Rawalpindi and Karachi by all categories of teachers except those in Commercial Institutes.

Books. Books in English are not only costly but difficult for students to understand. A scheme under the control of a Textbook Board, and technical boards for the production of textbooks, especially in the national language, is being implemented and quite a number of books have been produced. In addition, books on a variety of subjects have been written by interested teachers and are being sold in the market.

Cost per student. Based on the annual recurring expenditure of the Government College of Technology, Lahore, the cost per student per annum comes to Rs. 2,500.* Cost per student in other Polytechnics is approximately the same. In Vocational Institutes the cost per student is similar, but the figure for evening programmes is much lower as the courses are of shorter duration. Thus a course of six months' duration amounts to from Rs. 500 to Rs. 900 per student depending upon the type of course.

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* Approximately 9.90 rupees (Rs.) = 1 US dollar.

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PAPUA NEW GUINEA

by K. Kalo

Technical training in Papua New Guinea can be categorized in four levels of technical skills: operator; tradesman; technician; and technologist. Each of these categories is discussed below.

Operator level

The operator level is comprised of semi-skilled workers who are usually trained on the job by an employer or at a vocational training centre. Vocational centres in Papua New Guinea have a long history, going back to 1927. Vocational centres were recently made post-primary institutions, and in 1979 were taken from the Technical Division and placed in the newly-created Non-Formal Education Division.

Students. Vocational centres usually take trainees of at least 15 years of age so that few, if any, come straight from primary school. It is felt that more mature trainees are better able to make use of the training. In the mid-1960s, when vocational centres had a rapid expansion programme, there were many opportunities for trainees for employment as mechanics, carpenters, plumbers and so on, but as economic development slowed and full technical programmes got underway, trainees found themselves unable to compete with grade X leavers from the high schools.

A recent study by the Educational Research Unit of the University of Papua New Guinea, which compared a sample of primary, vocational and high-school leavers at home in their villages, found that vocational centre trainees had a greater retention of formal academic skills than primary-school leavers, but not as high as secondary-school leavers. This would suggest that additional vocational centre training has made some difference in the lives of those youths compared to those who had only primary education.

Courses offered. Today vocational centre leavers are being encouraged to look for opportunities in rural areas, particularly in self-employment. More emphasis has been placed on agricultural work and work in the informal sector.

Vocational centres are mostly small-scale institutions, ranging in number of staff from one to twelve, and the courses offered vary greatly between institutions. A large centre will have staff with different skills, the main ones being mechanics, carpentry, tinsmithing and agriculture for male students, and child care, home care, cooking, gardening, sewing, weaving, dressmaking, textile printing and handicrafts for the female trainees.

Some centres are practically industrial establishments, turning out finished products to meet a constant demand. The centre at Bulolo turns out tea chests for Highlands factories while Badili centre in Port Moresby runs a successful upholstery unit on a profit-making basis. In fact, the survival of the centres depends on their success in such ventures, although it also means that some local people find it difficult to compete with the centre's activity.

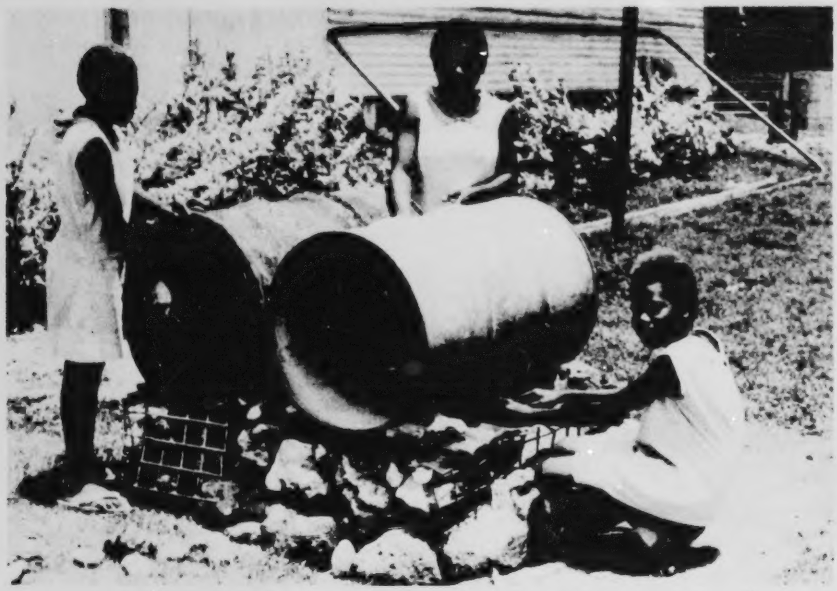
It is intended to establish follow-up activities with ex-trainees as an integral part of the vocational centre programme. This has not yet been possible because of lack of funds and shortage of staff.

Planning and responsibility. Under recent government-initiated moves, control of vocational centres has shifted to the provincial governments. Action is now being taken to reopen five of the centres which were closed in past years and to open five new centres. Expansion planned by the provinces must be financed from provincial government funding or, in the case of the East Sepik Centre which required four more staff, through the Asian Development Bank Project.

It is too early to tell what long-range plans provinces may develop for vocational centres. One possibility is that they will be used as district training centres to train provincial staff for new Community Vocational Centres (CVCs). These CVCs would be more than just vocational centres. In the North Solomons it has been suggested that each of the 30 community governments should have its own CVC, which would act as a youth centre and adult-education centre as well as offering vocational training and extension activities.

The national government still retains the responsibility for staff training, staff ceilings inspection and assistance with the development of curriculum materials. It is hoped that in the near future there will be one senior inspector and four regional inspectors with a sixth person to assist with women's programmes.

Staffing. Of the 221 staff employed to 31 July 1979, 71 per cent are nationals. This conforms to the Education Plan. In addition, there are 21 in the Australian Staffing Assistance Group, 50 Filipinos and 20 volunteers from different countries.



High school girls cooking bread in drum ovens

A major problem is the high turnover of both overseas and national staff. While teacher wastage in the primary system is at 5 per cent, it ranges between 14 and 22 per cent per year at vocational centres. Of the nationals trained since 1975 in the two training colleges mentioned below, 15 and 17 per cent have already resigned.

Staff training. There are two main training programmes at present for vocational centre instructors and managers.

1. Goroka Teachers' College. Students undertake a one-year course of study and receive a Diploma in Teaching Agriculture. Students must have graduated from an agricultural college.
2. Port Moresby Teachers' College. Students undertake a one-year course of study for men and a two-year home management course for women. A successful apprenticeship plus three years in industry are the entry requirements.

Financing. In 1978 the government contribution to the centres was K. 1,313,500, comprising K. 1,059,500 for salaries and K. 254,000 for other expenses.* This makes an average of approximately K. 296 per student, which is slightly more costly than that of a high-school student.

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* Approximately .67 Kina (K.) = one US dollar.

It must also be noted that this is not the full cost involved, because vocational centres must raise additional funds to cover maintenance, materials, aids and miscellanea.

Centres must of necessity charge an enrolment fee—usually K. 30 per student—and raise additional funds through a wide variety of business enterprises. Statistics on enrolment are given in Table 1.

Table 1. Vocational centres: enrolment by province, sex and type, 1978

Province	1st year			2nd year		
	Males	Females	Total	Males	Females	Total
Western	115	18	133	34	1	35
Gulf	85	17	102	23	-	23
Central	104	19	123	19	-	19
National Capital	312	192	504	19	23	42
Milne Bay	110	82	192	49	68	117
Northern	130	52	182	48	19	67
Southern Highlands	50	16	66	47	10	57
Enga	17	-	17	7	-	7
Western Highlands	124	25	149	38	23	61
Chimbu	84	6	90	-	-	-
Eastern Highlands	61	-	61	2	-	2
Morobe	361	74	435	119	6	125
Madang	213	73	286	37	37	74
East Sepik	154	68	222	9	16	25
West Sepik	125	34	159	38	31	69
Manus	32	22	54	24	17	41
New Zealand	48	27	75	50	50	60
E.N.B.	150	92	242	35	61	96
W.N.B.	89	21	110	13	11	234
N. Solomons	133	82	215	8	23	31
Total	2,497	920	3,417	619	406	1,025

Note: The table includes the five existing *skulankas* (see text)

Sources: a) Ministry of Education, Planning Services.
b) Ministry of Education, Provincial Operations (Vocational Centres Sec.)

Tradesman level

The responsibility for the training of tradesmen largely falls on the Technical Division of the Department of Education. The Division is also responsible for the training of secretarial and clerical students. Since the beginning of 1979, in response to recognized weakness in the former combined secondary technical system, technical colleges have been entirely

A trainee undertaking office duties at a vocational centre

post-secondary institutes. The following, extracted from the 1976-1980 Education Plan, summarizes the situation:

> Technical Colleges. Technical education is expensive to operate and difficult to staff. In Papua New Guinea, the nine colleges in this category will offer a variety of courses at different levels for boys and girls including apprenticeship training and block release. Since 1969 they have concentrated on a two-year secondary-level programme, taking students (almost exclusively boys) direct from Form 2 (year 8), and on shorter courses for secretaries and typists.
>
> The direct connection between the first cycle of high school and the technical colleges has led to problems. It has become clear that many students regard the technical college only as a substitute for the second cycle of high school, are poorly motivated, and do not intend to seek employment in which their skills will be used. Moreover, there is a need to review the programmes and courses and the volume of enrolment in relation to relevant employment opportunities, to the needs of employers for particular skills, and to the relationship between this level of technical education and the University of Technology. This review will take place. Meanwhile, for the period to 1980, no new technical colleges will be opened, and from 1976 grades IX and X courses will be progressively phased out, making all places in colleges available for specialist technical courses by 1979. By the middle of the Plan period, the future development of technical education in Papua New Guinea will be clearer to see.

The problems of motivation and wastage as seen by the National Education Board have been overcome. Figures issued by the National Employment Service show that a high degree of student motivation has now been achieved in the colleges. 1978 saw the completion of the change-over from technical high school courses to full-time technical training and since the beginning of 1979 this has stabilized on a structure of seven technical colleges and two secretarial colleges. The initial role of the Division was as follows:

1. To supply the trained manpower required by industry, commerce and the public sector;
2. To offer training or further training to those already in industry, commerce or the public sector;
3. To ensure that a pool of technically competent people is available in the rural areas to enable the balanced development of these areas, so raising the living standard;
4. To offer training to persons interested in acquiring basic technical skills for their own use either as assistance to their business or for recreational purposes; and
5. To ensure economic and effective use of the physical resources of the Division.

Students. In the past there have been considerable problems, both in quality and quantity, in attracting students to technical courses.

Since the introduction of a full-time 40-week Pre-Employment Technical Training scheme (PETT) and of a national scholarship (NATSCHOL) which gives the student K. 10 per week allowance and K. 20 per year for books, tools or safety equipment, the calibre of applicants has improved.

Courses. Papua New Guinea has chosen a high-level technology and because the students' own environment is not one that supports such a technology, a Pre-Employment Technical Training course was instituted. PETT courses run from 6 to 12 months and cover 19 trades. These are:

1. Aircraft maintenance engineer
2. Automotive electrician
3. Boatbuilder
4. Butcher
5. Carpenter and joiner
6. Clerk
7. Compositor
8. Electrical
9. Fitter and machinist
10. Hotel and catering training
11. Metal fabricator/welder
12. Motor mechanic
13. Panel beater and spray painter
14. Plumber
15. Printer
16. Radio mechanic
17. Sheetmetal worker
18. Bricklayer
19. Painter and Signwriter

A course in diesel and heavy equipment fitting is planned for 1980, and secretarial training is catered for by pre-employment training in typing, audio typing and stenography.

Trade or apprentice training is conducted in 19 areas and a PETT course is a pre-requisite for trade entry. The course provides students with a 'base level' contact and familiarizes them with the specialized language, tools and concepts of their chosen trade. Although only a recent introduction, the wisdom of such a move has already become apparent. In 1977 a survey of the grade X students in technical colleges showed that only one-third chose their trade as their area of employment, while another third did not wish to enter their trade at all. The PETT students, in contrast, have shown a very high motivation to enter their trades: in 1977, 93 per cent chose to work in the trade they had studied.

As stated previously, PETT courses are either for 20 weeks or 40 weeks depending upon the course, although the majority are 40-week courses. At the time of leaving the college, however, students have had

High school boys fencing school gardens

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minimal industrial experience and will be of very limited capability for some time. Their ultimate skill in their field will obviously depend on the on-the-job training given by employers. Any student who successfully completes a PETT course may, after a period of 12 months in industry, return to college to undertake extension courses. These courses are designed to give trainees deeper knowledge of their field and to reinforce the learning absorbed during the PETT course. The number of extension courses varies according to the skill area, but the more basic practical trades have one six-week extension course, while other trades have two courses of up to 12 weeks each--which are offered following a further 12 months in industry.

The apprenticeship system is now firmly interwoven with PETT training. Under the agreement with the Apprenticeship Board, any person wishing to enter into an apprenticeship must have first completed the relevant PETT course. To successfully complete an apprenticeship, a person must serve the required period and, in addition, have passed a PETT course and the necessary extension courses.

The Apprenticeship Board sets minimum entry levels for persons wishing to enter into an apprenticeship, and this Division accepts the same standard. The majority of trades now require a pass at grade X (Form 4) although some trades still only require a pass at grade VIII (Form 2). Most of the students applying for PETT courses are now in fact post-grade-X, so that most apprentices will be at this level. These levels apply to school leavers and are not necessarily valid for people who have shown proven ability in industry. The authorities are anxious to advance as many skilled workers as possible and are prepared to enrol people who are below the normal educational level provided they are recommended and sponsored by an employer. Employers wishing to enrol such trainees must, however, realize that there can be an enormous strain upon a trainee who does not meet the educational criteria, and that years of work experience may not necessarily equip him in such fields as maths or science.

The Division has been developing a range of courses which could be best described as meeting the need for workers at the semi-skilled level, although additional modular training courses are, or will be, available should these workers have the potential to progress. Courses such as the Small Engines Maintenance Course and the Agricultural Mechanics course are currently 40-week terminal courses and are designed to fill the need for basic technology in the rural community.

Planning responsibility. The Technical Division of the Education Department is responsible to the Minister of Education: unlike the vocational centres, technical education is still a national responsibility.

In addition to the formalized structure, the Division has a body comprised of members of industry, planning, labour and education to advise the Secretary. This is called the Committee of Technical Education (COTE); it looks into recommendations on all matters relating to technical education. In the various technician and secretarial areas there are Boards of Studies (BOS), responsible for making recommendations to the Secretary on matters such as curriculum and assessment. As in the COTE, members come from a wide range of industries and government departments and from the educational field. The impact and input of these committees in influencing and developing the system has been very marked.

At the college level, contacts with industry and commerce are kept through each college's Governing Council. These bodies contain wide community representation and assist the department, through the Principal, in managing the college.

The other liaising body between technical education and industry is the Apprenticeship Board. This is however responsible to the Minister for Labour and Industry, and the Education Department is currently seeking the services of an expert to advise on the setting-up of a national training council. This body would be responsible for developing and co-ordinating occupational training for industry and commerce, and provide the manpower planning at present lacking in this country. At present, collation of all post-secondary educational data is the responsibility of the Office of Higher Education.

There has thus arisen a proliferation of institutions involved in training apprentices, probably because of the need to produce trained personnel urgently. There is much duplication of the work done in the technical colleges. Other work, although not duplicating, could best be done in a technical college. The diploma of commerce offered at the University of Papua New Guinea is an example of this. At present there is a nationalization of courses taking place; for instance, the Electricity Commission of Papua New Guinea is gradually phasing out PETT and Apprentice Training.

Staffing. The Technical Division is continually beset by staffing difficulties, mainly due to the specialized nature of the courses offered and the fact that all the teaching staff are qualified in a trade or profession prior to entering the service. This means that the salaries and conditions offered should be able to attract and retain suitable staff. There is a heavy reliance on overseas teaching staff.

The programme to train national technical teachers was progressing well but has been set back by poor enrolments over the past two years and by a high drop-out rate. The Division estimated a total of 89 nationals in strength by June 1978 whereas the actual total at that time was 66—a shortfall of 23 staff. This low rate of achievement is due mainly to the low salaries offered. Recently the Teaching Service Commission approved an increase of salaries which, it is hoped, will achieve a better recruitment and retention rate. In the meantime, however, salaries and allowances for qualified workers in industry have also risen.

The Division has met the target dates as set down in the Five-Year Education Plan, but it should be noted that the staffing and enrolment figures shown were unrealistic in terms of the Division's physical resources. A limited review of staffing and facilities has now been carried out and proves the definite need for revision of the original enrolment figures. For example, the 1978 actual enrolment was only 2,400, and 2,500 in 1979, as compared to a target figure of 4,500 for each year. The new projection for 1980 is now 2,600. Three major factors have caused this change:

1. The reduction in the building programme for technical colleges;
2. The increased utilization of workshop facilities by groups undertaking full-time technical training; and
3. Transfer of the responsibility for nautical training from the Department of Education to the Department of Transport, Works and Supply.

Staff training. As the country has opted for a high-level technology, and as there is no reversal possible, technical education must be emphasized—especially at the trade/technician level and consequently at technical trainer level. The problems in this area are identical with those in many developing countries because of the critical shortage of trade-trained and sub-professional manpower.

Analysis of divisional costs. The actual cost per trainee-year has risen, but this was inevitable in order to raise the standard of technical training.

The cost of training can be divided into three main categories. These are (1) staffing, (2) student maintenance, and (3) facilities (plant).

Full-time technical training is more expensive to operate than the former technical high school training. Under the new system, classes will be grouped for theory subjects (10 hours per week) and remain in groups of 15 for practical trade work. This means that there are now 50 hours of teaching per week for a group of 30 students. Taking the Division as a whole, the staff/student ratio will drop from 14.1 to 12.1.

The increased time spent on practical training also means an increase in classroom material costs. The time spent on practical training has in fact more than doubled, with a resultant rise in costs. The Division costed the former technical high school courses at K. 270 per student per year, whereas the newer full-time technical training courses (PETT etc.) were costed at K. 400 per student per year. This last figure was based on the assumption that full-time students in technical and secretarial colleges would come under the same financing arrangements as all other higher education students. Block training courses at both trade and technician level are based on a reduced scale varying from K. 100 to K. 300 per student-year depending on the extent and cost of workshop training and materials. Students pay a fee to help cover costs. A number of newer courses for people already at work are self-supporting. A fee is charged to cover all operating costs with the only major cost to the government being that of the teacher's salary.

The Division currently has workshops, classrooms and dormitories available for all planned courses, but when introducing courses in new technical skills it is necessary to purchase specialized teaching equipment. At present, after qualifying in their trade and obtaining several years' industrial experience, local officers are sent to Goroka Teachers' College of the University of Papua New Guinea. On successful completion of one year's training they receive a Diploma of Teaching–Technical.

Under a recently-negotiated World Bank loan a Staff Development Officer has been appointed to the Division. His task is to identify areas of need and organize programmes in order to raise the level of professional competence of the teachers. He is also responsible, in conjunction with the Education Department's Staff Development Unit, for identifying and arranging programmes for national officers so that they may assume more of the responsibility for the planning and implementation of the Division.

Technician education

This aspect of training is also a function of the Technical Division of the Education Department and is still in the process of development at the Lae Technical College. An expansion programme has been under way for several years through a World Bank loan. This includes extensions to the physical facilities, such as laboratories and equipment, as well as the appointment of four specialist curriculum officers who are engaged in job analysis and industry requirements prior to the drafting trial courses with the assistance of the staff at Lae.

Of the seven technician courses run at present, over 87 per cent of the students are from government departments, statutory authorities or Bougainville Copper, and less than 100 students have been sponsored by other private enterprises or companies. This could well be an area in which there are significant shortfalls. Courses at present are on an in-school, off-school basis, in which the employee attends the college for approximately six months each year for three years.

Students. As we have seen, allowances are made for employers who wish to sponsor employees to any course. It is appreciated that, as sponsorship involves considerable expense to the employer, proven work performance may override the requirements for academic excellence. There is however a general requirement that for enrolment in certificate courses a student must have industrial training or experience and have passed tenth grade. This usually places the students in the adult category, and in fact in most cases they have successfully completed a trade course.

Courses. Courses can be designed to meet the needs of industry. At present, for example, a survey of employers is being conducted to see if there is sufficient demand to warrant running a draughting course. Established courses and the number of students involved can be seen in Table 2.

Table 2. Number of students graduating from Certificate Courses 1975/79

Discipline	1975	1976	1977	1978	1979	Total
Building Certificate	15	28	48	26	26	143
Laboratory Technician	17	11	18	11	-	57
Civil Engineering	21	20	24	24	-	89
Mechanical Engineering	14	15	7	14	-	50
Electrical Engineering	9	16	9	33	-	67
Commercial Certificate	11	18	5	17	-	51
Catering Certificate	-	6	-	3	-	9

Staffing. As in the general technical area staffing is a serious problem. On the basis that a teacher should be at least three years ahead of his students in terms of the subject knowledge, the type of highly-qualified instructor needed in this area is also in demand for industry and commerce. It is hoped that new salary offers will be more attractive to both local and overseas officers.

A pre-requisite for lecturers at Lae is a degree or diploma in the appropriate field together with at least two years' industrial experience and preferably a form of teacher training.

Professional technologist training. This area of technical training is the responsibility of the University of Technology at Lae. In the mid-1960s a polytechnic was established which was quickly given university status, and has produced some 67 graduates in 26 technically-related fields since then.

Students. Students must qualify for University entrance, that is, have completed year 12 at a National High School and gained successful passes in the required pre-requisite subjects. Students receive the National Scholarship at the same rates as technical students. The usual age of students is from 18 years upwards.

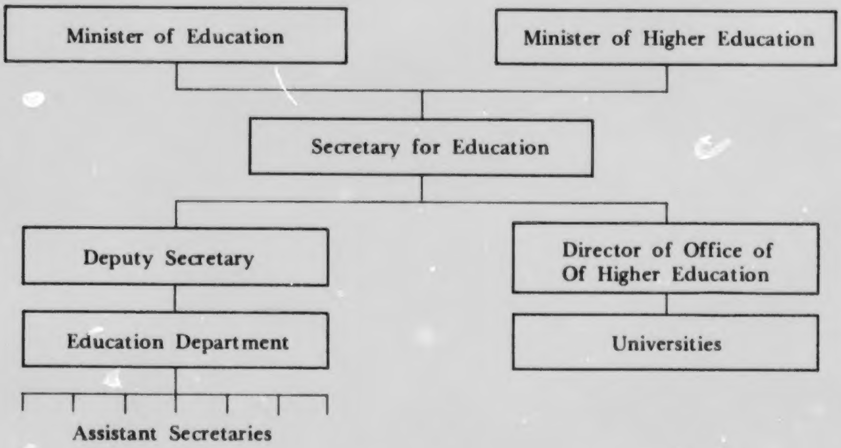
Courses. The following degrees, diplomas and certificates are offered by the University:

		Years
Faculty of Architecture and Building		
Bachelor of Architecture and Building		5
Faculty of Business Administration:		
Bachelor of Commerce		5
Bachelor of Technology	(Accountancy)	4
Bachelor of Technology	(Business Studies)	4
Bachelor of Technology	(Computer Studies)	4
Diploma in Commerce		3
Faculty of Engineering:		
Bachelor of Engineering	(Civil)	5
Bachelor of Engineering	(Electrical)	5
Bachelor of Engineering	(Mechanical)	5
Bachelor of Technology	(Surveying)	5
Diploma in Communication Engineering		4½
Diploma in Cartography		3
Diploma in Valuation		3
Certificate in Surveying		3
Certificate in Cartography		2
Faculty of Natural Resources:		
Bachelor of Science	(Food Technology)	5
Bachelor of Science	(Mineral Technology)	5
Bachelor of Science	(Forestry)	5
Diploma in Fisheries Technology		3

The degrees of Master of Science and Doctor of Philosophy may be taken subject to negotiation with the appropriate Head of Department.

Planning and responsibility. The Universities come under the control of the Minister of Higher Education although close ties are maintained at present with the Ministry of Education by virtue of the role of the Secretary (see Figure 1). Unlike other institutions, the Universities were established by an Act of Parliament. They are in a sense autonomous institutions, and may within the limits of their enabling acts conduct their own affairs. In matters of funding they are almost entirely dependent on the Government and since 1977 have been subject to quarterly financial expenditure reviews conducted by the Department of Finances.

Figure 1. Organization of higher education


Minister of Education
Minister of Higher Education
Secretary for Education
Deputy Secretary
Director of Office of
Of Higher Education
Education Department
Universities
Assistant Secretaries

Staffing. The problem facing the Technical Division with respect to staffing is also affecting the Universities. Lecturers are required to have at least a first degree in their particular field and preferably some industrial experience. At present there is little formal training of staff as lecturers, although the need for this has been discussed.

Cost analysis. University training is extremely costly, although the exact expenditure on higher education cannot be quoted at present in the absence of up-to-date statistics. However, the average unit cost of training at technical and teachers' colleges in ratio to primary education is estimated at 12:1.

Problems and constraints

Co-ordination. The lack of an overall system of co-ordination and rationalization of facilities, and the absence of an accurate manpower study, make planning very difficult and increase the cost of training. It also means that training 'lags' instead of leading industrial requirements.

Recruitment. There are problems of both recruitment and retention of adequately-prepared staff. It is recognized that no matter how much is spent on upgrading the physical resources of the training institutes, they will only succeed when they are staffed by highly-skilled, trained and dedicated national staff able to design curriculum and implement training programmes. In the meantime, overseas officers who have the necessary qualifications and experience both in their skill area and in the area of management are needed. These officers must become a central feature of the national staff upgrading.

Buildings and equipment. At present this problem is being dealt with in a reasonable manner. The ability to set up laboratories, workshops and classrooms is limited by the availability of funds. A system of 'self help' has been accepted by staff and students, and many improvements have resulted from their efforts.

Transportation. Because parts of Papua New Guinea are separated by ocean major growth areas are widely scattered. The important implication is that institutions must be designed as boarding colleges and programmes presented on the block attendance pattern. This in itself creates major financial and administrative problems.

Because of the distance between centres, there arises an educational problem of what to do with students who fail in one or two subjects only in any given year. They cannot be brought into the college for one subject only, nor are there correspondence courses, except in the Commerce Certificate. Self-study and assignment techniques are used, but such students should be given greater post-course opportunities to qualify.

Educational technology. Falling standards, particularly in language skills, are a recognized problem in Papua New Guinea. For many reasons, the national government decided to choose English as the language for learning, commerce, and industry. With the lowering of standards student comprehension has diminished, largely due to an inability to conceptualize in English. This means that most students are still very much performers in the 'concrete phase' of development.

To overcome this a suitable level of audio-visual and concrete aids should be developed for use in colleges. High-school students are generally poorly informed about technical careers, and there is an urgent need to continue to supply guidance, career counselling and career information to high schools. The division has been hampered in overcoming this problem because of a shortage of funds and manpower.

Like all post-secondary institutions, technical colleges are feeling the effects of deteriorating standards in academic subjects and recognize the need for remedial programmes in mathematics and English. One specialist has been appointed in each area, but lack of funds inhibits the full use of such people.

Curriculum

At all levels of technician training the same basic procedure applies:

1. The need is established, varying considerably depending on the level. In the Technical Division the trade panels or the Board of Studies, usually acting on advice from employers or industry, suggest changes or improvements to the curriculum used by the department. Often advice to the panels comes from the Department of Labour and is based on employment trends or statistics provided by the Bureau of Statistics. Changes have also been presented to the panels or Boards from individual teachers and lecturers.
2. Once the need is established, an officer is usually designated to survey employers and confirm their requirements.
3. After confirmation, a task analysis is undertaken, the job analysed into the various components, and the general objectives defined. This is done in consultation with practising teachers and the responsible Panel or Board.

In the past there was an inclination to stop at this stage, but recently more attention has been given to specific behavioural objectives. In order to achieve this, a curriculum officer works with several practising teachers prior to submitting material to the responsible body. As mentioned above, this contribution is only part of the training. The employers/sponsors are responsible for continuing the training process and ensuring that the work given at the college is reinforced, developed and related to the trainee's particular area. The weighting of the courses is as follows:

PETT Apprentice Block Courses

70-80 per cent–practical work on specific trade
20-25 per cent–related trade theory
Up to 5 per cent–academic – maths/English.

Certificate Courses

Up to 60 per cent–practical
Up to 40 per cent–related theory
Up to 5 per cent–academic – maths/communication.

Current programme. As part of curriculum development there has been assistance from the Colombo Plan Staff College in the training of staff in curriculum work. A number of staff have attended the long courses at the College or in-country courses offered in the past year. This means that there is now a working base of practising teachers who can contribute to detailed curriculum exercises.

The second phase of the overall plan for curriculum development occurs in 1979/80 when up to four staff per discipline are brought in for periods of one to two weeks to write specific behavioural objectives for their discipline. A permanent curriculum officer will work with them and ensure that this is documented, printed and distributed.

Phase 3 begins at the end of 1980 when the curriculum will have been distributed and tried. Staff will be brought together to prepare support material, including audio-visual material and other 'concrete' aids, for distribution. Phase 4 will occur in early 1981 when a detailed evaluation will be undertaken. During all four phases the staff and facilities of the Colombo Plan Staff College will provide training for personnel, act in an advisory capacity and to a certain extent monitor the work.

New developments

It is hard for anyone involved in technical education to foresee future trends with any accuracy. This is a field of activity which is constantly undergoing change. In one case in Papua New Guinea last year, the National Airline sold all its DC3 aircraft and changed to Fokker F28 jets. This meant a sudden drastic change in training for the aircraft mechanic course–a change which it has been possible to meet.

At present, plans are under way to commence operations on two large copper-mining developments during 1980. These will be as large as the Bougainville Copper mines in the North Solomons, and will require the training of at least another hundred electrical apprentices per year as well as possibly two hundred more mechanics and fitter machinists. For a small system already operating almost to capacity this means that facilities and staffing must be upgraded.

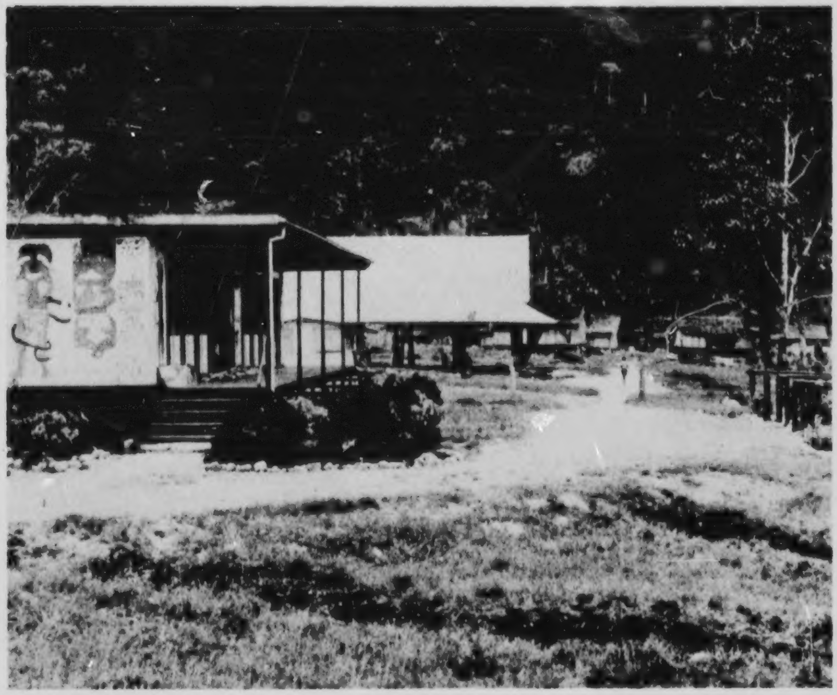
A technical teachers' training centre is also planned, and will be involved in five main areas of activity:

1. Training educators–one-year course;
2. Training instructors–six-to-eight-week courses;
3. Skills and technique upgrading–one semester (12 weeks);
4. In-service training; and
5. Educational technology resources centre.

It is hoped that the centre will cater for all areas of technical activity, from the police force to the national airlines, and that it will be of sufficient standard to offer a first-class facility for other countries in the region.

The one-year course will train teacher-educators for colleges and the vocational centres. The short instructor course is mainly for such groups as the Police Force, Electricity Commission, Bougainville Copper, and Air Niugini. Its object will be to outline basic methods of instruction plus the use of aids. The upgrading course will be for national teachers and will be based on lines similar to the Technical Teachers Improvement Centre in

Bendung. In-service training components will be a flexible unit geared to meet the needs not only of local staff but also of other institutions. In an industrial survey it was found that many private, semi-private and government bodies wanted such a facility. The educational technology unit will train anyone registered for service. Thus it is hoped that through staff training and retraining, curriculum designs improvement, and effective planning and utilization, a sound system of technical and vocational education will result.



Bulletin of the Unesco Regional Office
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PHILIPPINES

by J.R. Vergara

Introduction

The development of technical and vocational education and training in the Philippines to complement the planned growth of the economy during this decade has been of primary concern to the national government. This was manifested with the passing of the Educational Development Decree in 1972, under which a ten-year national educational development programme was undertaken to increase the contributions of the entire educational system in general, and technical and vocational education in particular, to the attainment of social and economic goals.

Part of the development programme was the undertaking of several projects for, among others, the improvement of the curriculum programmes in all levels of the system, the upgrading of academic standards, the expansion of existing programmes and the invention of new cues for the training of middle-level technical and agricultural skills. Specifically, new technical institutes, skills training centres, and other non-formal programmes for out-of-school youth and the unemployed were established. Simultaneously, existing institutions offering similar programmes were strengthened with the infusion of additional logistic support.

Growth of technical and vocational education institutions

Over the last five years (1974-1978), the number of public vocational schools under the Ministry of Education and Culture (MEC) has increased from 280 in 1974, with a total enrolment of 102,000, to 330 schools having an enrolment of 206,000 in 1978. For the same period, the number of private vocational schools has risen to 1,163, with a total enrolment of 192,000.

Of the 330 public vocational schools, 113 are agricultural schools, 69 are fishery, 129 trade-technical, and 19 home industries. Of the private vocational schools, 1,104 are special vocational schools offering non-credit courses in fashion, business, trade-technical, and agriculture, while 59 offer post-secondary and collegiate programmes in agriculture, technical and teacher education.

Apart from these institutions, there are 32 state colleges and universities offering technical and vocational education programmes–nine agricultural colleges, 15 colleges of arts and trades, and eight at the university level offering both agriculture and technical programmes.

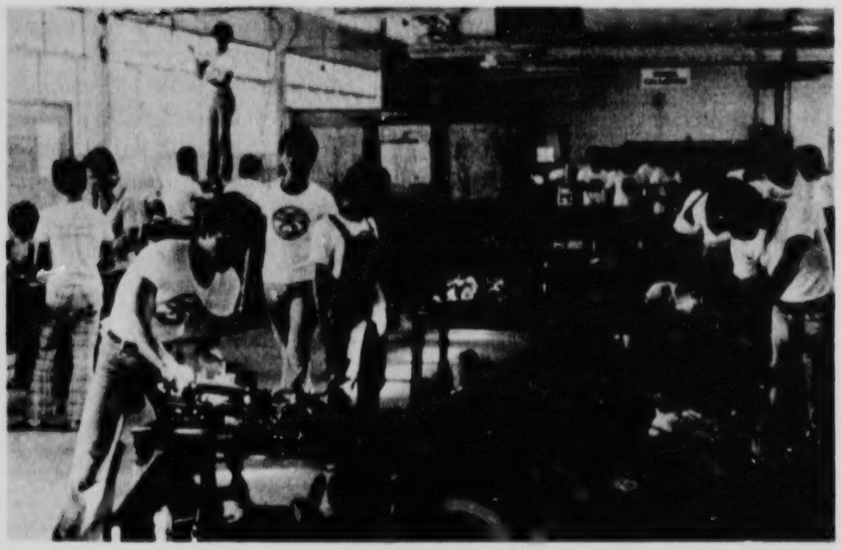
In addition, the National Manpower and Youth Council (NMYC), until very recently attached to the Office of the President, having been under the Ministry of Labour, operates ten Regional Manpower Training Centres (RMTCs) distributed in growth centres of the country. The RMTCs are concerned with skills orientation and development requirements of out-of-school youth and community adults. In co-ordination with the private industrial sector through the different industry boards and the public sector through the MEC and other government institutions, the NMYC offers non-formal courses in agriculture and trade-technical as well as special skills-upgrading courses for vocational teachers. The participation in NMYC programmes increased from 17,000 in 1974 to 44,000 in 1978.

There have also been established, in collaboration with the private industrial sector, three technical institutes–the Manila Technician Institute (MTI), Visayas Technician Institute (VTI), and Iligan Technician Institute (ITI). These institutes are offering three-year technician courses. For the school year 1978–1979, the enrolment for the three institutes was 1,772.

When the Philippine College of Arts and Trades was converted into the Technological University of the Philippines in June 1978, the MTI and VTI were placed under the administrative supervision of the University. The ITI retained its attachment with the Mindanao State University.

Programme formulation. The Ministry of Education and Culture, having administrative functions over the schools (excepting state colleges and universities), is responsible for the overall planning and development of technical and vocational education in the country through its regional offices. It formulates necessary guidelines, and input and output standards, in accordance with the policies, plans, and programmes promulgated by the National Board of Education (NBE), the highest policy-making body on educational matters.

The NMYC, in accordance with its mandate, provides the leadership in the training of manpower required by the industries. It was authorized to co-ordinate the manpower training schemes and to formulate the long-term manpower development programme in the context of the Philippines Development Plan. It was also given the task of establishing appropriate industry boards representing the private sector and to formulate national skills standards for different trade areas.



To date, several boards have been created: the Automotive Industry Board (AIB), Construction Industry Board (CIB), Power and Electricity Industry Board (PEIB), Land Transportation Industry Board (LTIB), Garments and Textile Industry Board (GTIB), Shipbuilding Industry Board (SIB), and the Petrochemical Industry Board (PCIB). The AIB and CIB trained 153 and 149 workers respectively in 1978. The others, being relatively new boards, are still laying the ground-work for their operations.

Financing. The government appropriates a certain amount for the operation of public vocational schools. These appropriations are augmented by tuition and other authorized fees from the students. In 1978, appropriations for public vocational schools amounted to 230 million pesos, up from 160 million pesos in 1974. The 1978 appropriations do not include the 835 million pesos given to state colleges and universities.*

Private vocational schools, on the other hand, depend mainly on tuition and other fees charged to the students. For some schools, assistance from external sources comes in the form of grants or donations.

National system of technical and vocational education

The system of technical and vocational education begins at the secondary level of Philippine education. A general programme of practical arts which deals with the study of agriculture, industry, home economics, fishing, and business and distribution are provided. Along with practical arts, pre-vocational options are provided. The emphasis on both programmes is in providing work experience in using the more common tools, materials, products, and processes of the different technologies under study. As a result, the students acquire knowledge, skills, appreciation and desirable work habits that would enable them to participate productively in community affairs. After secondary schooling, the students may elect any of three possible alternatives: college work, employment, or technical/vocational training.

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* Approximately 7.35 pesos (P) = US 1 dollar.

Programmes in technical/vocational education include special vocational courses of short-term duration, two-year agriculture, trade/technical, fishery, and business courses, three-year agricultural or industrial technician courses, and four-year technical/vocational teacher education courses.

Teacher training

As of 1978, there were 105 teacher-training institutions of which 40 were for agriculture, seven for fishery, and 58 for vocational trades (trade-technical). Enrolment in these schools for the same year totalled 14,000, as compared to 4,723 in 1974.

Generally, the curricula offered in teacher-training institutions are of four years' duration leading to the completion of a BS degree with appropriate major fields of specialization in a trade occupation, agriculture, fishery or home-making.

Students who complete the industrial education degree (BSIE) usually find teaching assignments in general secondary schools, trade-technical schools and other vocational institutions. BSIE holders must have a major trade field like automechanics, electronics, garment trades, or machine shop to be qualified to teach a specialized trade course.

In addition to the training programme of teachers for craftsmen and technicians, the industrial teacher-training institutions provide pre-service education for those who will teach industrial arts in the elementary schools and practical arts programmes in the general secondary schools. This programme is also for four years and leads to a bachelor's degree in industrial arts (BSIA). BSIA degree-holders have broad training in such industrial areas as handicraft, woodworking, metal work, electricity, ceramics, graphic arts and an agricultural background in gardening.

To augment the professional competencies of technical and vocational school teachers, the MEC, in collaboration with NMYC, is conducting a special programme for the in-service training of school teachers, using the facilities and operations of the latter institution. Other institutions, particularly state colleges and universities, are offering the same opportunities for vocational teachers. Summer training institutes and week-end courses are regularly conducted.

Types of institutions

The following are some types of institutions offering full-time programmes:

1. **Public** – school of home industries
   – schools of fishery, agriculture, and trade-technical programmes at the secondary level
   – schools of agriculture, fishery, and arts and trades, with secondary and 2/3-year post-secondary programmes
   – schools of agriculture, fishery, and arts and trades, with secondary and post-secondary teacher education programmes
   – State colleges/universities in agriculture, arts and trades, and fishery, with teacher education, graduate programmes

   Non-formal – RMTCs under the NMYC
2. **Private** – Special vocational courses (non-credit)
   – Vocational schools (post-secondary and collegiate)

Problems and alternatives

While technical and vocational education and training in the Philippines has made significant improvements in programmes and rates of participation, there are still certain problem areas that need strengthening. Some of these are:

1. The inadequacy of existing facilities in qualitative and quantitative terms;
2. The dearth of qualified teachers to handle vocational courses in both the public and private sectors and in the formal and non-formal system. This is aggravated by the attraction offered by foreign employment, as well as the transfer of teachers to other government and private agencies offering higher compensation;
3. The lack of an administrative mechanism to integrate vocational programmes of public vocational schools with those of the private system and state (provincial) institutions.

Significantly, though, there was established in December 1978 a National Polytechnic System with the Technological University of the Philippines (TUP) as the apex of the system, and with three technician institutes under TUP, the ten Regional Manpower Training Centres, and all other state-supported institutions offering similar programmes as components of the system. The rationale for the establishment of the MPS is "the urgent need to integrate all programmes and activities of those institutions to maximize the utilization of available resources towards the production of the technical manpower needs of the country."

Then, in May 1979, a Presidential Study Committee on technical/vocational education was set up with a view to rationalizing technical and vocational education programmes at the second and third levels of education. The government agencies are the Ministry of Education and Culture, National Economic and Development Authority, Ministry of Industry, Ministry of the Budget, Ministry of Labour, National Manpower and Youth Council, and National Science Development Board. Also included are the Office of the Fund and Assistance to Private Education, the Philippine Chamber of Commerce and Industry and Office of the Co-ordinating Council for Private Education Association.

Curricula of technical and vocational education

Technical and vocational education in the Philippines is both formal and non-formal, and is offered in various curricula in public and private schools.

1. Short-term courses:
   - a) One group of short-term courses is offered in public and private schools,and ranges from six weeks' to one year's duration. These courses are of the non-formal or of the vocational-training type.
   - b) Another group of short-term courses is offered in other government agencies like the National Manpower and Youth Council (NMYC), Ministry of Social Services and Development (MSSD), National Cottage Industries Development Authority (NACIDA), Bureau of Agricultural Extension (BAEX), and Cottage Industry Development Enterprise (CIDE).
2. Four-year secondary courses:
   - a) Revised Secondary Education Programme, 1973
   - b) Revised Secondary Education Programme for Agricultural Education
   - c) Revised Secondary Education Programme for Fishery Schools
   - d) Revised Secondary Curriculum for Vocational/Trade Schools
   - e) Secondary Curriculum in Distributive and Business Arts
3. Two-year (post-secondary) curricula:
   - a) Two-year trade-technical
   - b) Technical agriculture curricula
     - i) One-year post-secondary course in farm mechanics
     - ii) Two-year associate in agriculture
     - iii) Two-year agricultural technician
   - c) Technical fishery curricula
     - i) Inland fisheries
     - ii) Marine fisheries
     - iii) Fisheries technology
4. One-year and two-year courses with ladder-type collegiate curricula:
   - a) One-year courses
     - i) Junior electrician
     - ii) Junior electronics technician
     - iii) Computer aide
     - iv) Business-machine technician
     - v) Printing technician aide
   - b) Two-year courses
     - i) Senior electrical technician
     - ii) Senior electronics technician
     - iii) Computer technician
     - iv) Senior business-machine technician

Objectives of curricula

1. Short-term courses are purely vocational in nature. The length of training is usually five hours a day, and includes instruction in

shopwork, related science, related mathematics, and related drawing. The objectives:

a) To serve the needs of a large number of students for skills in the shortest time possible;
b) To introduce new courses as the employment opportunities in the courses already being offered diminish.

2. Secondary education functions as (i) continuation of general education started in the elementary grades; (ii) preparation for a vocation; and (iii) preparation for college. It should enable students to:

   a) Develop a reasoned commitment to the goals of national development by cherishing, preserving, and developing moral and spiritual values and other aspects of the national heritage that are desirable in Philippine society;

   b) Understand the wide possibilities of the arts and the sciences as permanent sources of pleasure and profit, and discover, broaden, and heighten their abilities in and appreciation for them;

   c) Acquire the occupational skills, knowledge and information essential for obtaining initial gainful employment, and for making intelligent choice of occupation or career;

   d) Acquire further skills in thinking, speaking, and writing, and develop the ability to react intelligently and creatively to mass media and other life situations;

   e) Obtain experience and form desirable attitudes for understanding themselves, their own people, and other races through opportunities for living vicariously with a wide variety of peoples, thereby prompting a keen sense of self and family and of national and international communities; and

   f) Demonstrate understanding, acquisition, and application of the basic concepts and methodologies of the different branches of human knowledge in order to promote their physical, intellectual, emotional and social well-being.

3. Technical education has as its objectives:

   a) To prepare workers to enter industry; and
   b) To train employed workers for advancement in industry.

Occupational areas and subjects covered

1. Short-term courses offered in the schools include such areas as auto-mechanics, building construction, electricity, garments, bakery, and sheet metal which are offered as blocks or units. The student gets a certificate for each unit or block completed.

Other short-term courses are offered by the NMYC, MSSD, NACIDA, BAEX, CIDE, and others which provide for training in agricultural skills, industrial skills, integrated skills, skills in cottage industries and basic skills training.

2. In the secondary curricula, the following occupational areas are emphasized:

   Home economics
   Agricultural arts
   Industrial arts
   Business and distributive arts
   Fishery arts

   As approved by the Ministry of Education and Culture, a Supervised Farming-Oriented Secondary Vocational Agriculture Curriculum was offered, with the following highlights:

   a) Practical arts/vocational courses were provided as Vocational Agriculture I (principles of crop and animal production), Vocational Agriculture II (horticultural and agronomical crops), Vocational Agriculture III (poultry, swine and livestock production), and Vocational Agriculture IV (advance crop and animal production). Farm mechanics was to be integrated in any agricultural enterprise;
   b) Farming programmes and home-making are taken from first year to fourth year as vocational electives;
   c) The home-making programme in the first two years is exploratory in nature;
   d) The related subjects in the Revised Secondary Vocational Agriculture Curriculum (BVE Circular No. 6, s. 1972) are replaced by the subjects in the Revised Secondary Programme of 1973.
   e) The following are offered as electives:
      - Plant and Animal Protection
      - Agricultural Economics and Farm Management II
      - Agricultural Economics and Farm Management III

   Certain adjustments were also made in the curriculum to allow students following the secondary agricultural curriculum prior to 1973, to continue. Emphasis was placed on fishery, arts, home economics, and distributive and business arts.

   For the trade and vocational schools, trade drawing, blue-print reading and arts appreciation which were subjects in the old secondary curriculum were allowed to be retained. Under this programme, emphasis was on practical arts, industrial arts and vocational electives or shopwork.

In the secondary curriculum, which emphasizes distributive and business arts, the first two years in practical arts are given to exploratory work. Practical arts in the third year include book-keeping, stenography and salesmanship with elementary typing and elementary co-operatives and business communication skills as electives, and in the fourth year, book-keeping, stenography and salesmanship are still the practical arts courses while the electives are advanced typing, advanced co-operatives and office store practice.

3. For the technical curricula, the following are the occupational areas:
    - a) Agriculture
        - Farm mechanics
        - Agriculture technician course
        - Associate course in agriculture
    - b) Fishery
        - Inland fisheries
        - Marine fisheries
        - Fisheries technology
    - c) Trade-technical
        - Automotive
        - Building construction
        - Ceramics
        - Cosmology
        - Furniture and cabinet-making
        - Garment manufacture
        - Printing
        - Drafting
        - Electricity
        - Electronic communication
        - Foods
        - Sheet-metal
        - Stationary marine engineering
    - d) Business trade
        - Secretarial courses
        - Business machine technician courses
        - Computer technician courses

Weightage. The curricula in the short-term courses provide for the integration of related mathematics, related science, and related drawing to shopwork in each of the occupational areas offered and are done with real tools, machines and materials in an industrial setting.

In the secondary curricula which emphasize agriculture, fishery and vocational/trade education, theory and practice are both offered. Except in cases where theory is given a separate time allotment, it is usually integrated with shopwork. However, there are specific subjects which are offered to lend support to shopwork. These are the communication arts, social studies, science and mathematics. By time allotments, the number of hours assigned to shopwork (about 1,800 hours in four years) is matched by 1,800 hours in the related subjects combined.

In the trade/vocational curricula, shop theory is also integrated to shopwork. The total number of hours assigned to shopwork is nearly one-fourth of the total number of hours given to all related subjects such as

languages, social science, drawing, mathematics, science, physical education and Citizen Military Training.

Differences in programmes. The prescriptive nature of the various curricula in technical and vocational education—formal or non-formal—by grade levels, in either the public or private schools, does not provide for much flexibility. There are thus not many differences between programmes in urban and rural areas or between males and females. As most schools are co-educational, courses are open to both males and females.

Infrastructures, facilities, equipment, tools, materials, and teachers do affect considerably, however, the implementation of curricular plans in both urban and rural areas. While schools in urban areas are better financed, both types of school encounter problems of inadequacies.

The input is another factor in that students in urban areas are more exposed to tools, gadgets, appliances, and equipment in their own homes than are those in rural areas, where in some places electricity is not yet known. This exposure reduces learning and training time for students in urban areas.

Salaries paid to teachers in urban areas are much higher than those paid to teachers in rural areas. Under this situation, better-qualified teachers are attracted to urban areas, especially to those public schools which are funded by the national government in the provinces and in the cities. This is also true with private schools and colleges that pay higher salaries and which are usually found in capital towns and cities.

The relationship of curriculum to productive work. The various curricula are related to productive work in many ways. In addition to actual workshop practice using real tools, machines, and materials in the production of real or type jobs, productive work is integrated in the curriculum through on-the-job training or placement in industrial establishments, by accepting job orders from customers in the community, and similar strategies, in both non-formal and formal programmes.

The practical work of students in agriculture is progressive in nature and scope, from the first year to the fourth year, gradually emphasizing for the individual students the farm experience related to plant and animal production. Field work is correlated with courses in horticulture, agronomy, animal husbandry and farm economics.

For the girls, productive work includes home economics activities and community extension work such as light gardening and orchard work, poultry, swine and goat raising, dairying, handicrafts, menu planning and club work. Other activities include trial planting of new rice varieties secured from the International Rice Research Institute, artificial insemination, certified rice seed production, seri-culture and mushroom culture.

The productive work of the fishery schools consists of oyster culture, freshwater, fishpond, fresh coral operation, salt manufacture, prawn and shrimp culture, fishpond fertilization, and bangus culture. The objective of these activities is to provide training in the production of fishery goods on a large scale following scientific methods and management techniques.

The personnel of fishery schools give technical assistance in rigging fishing boats and in operating various fishing gears, proper use of non-preservatives, the right mixture of preservatives, construction of fishing gears, fishing preserving methods, growing algae, and the organization of co-operatives among small-scale fishermen.

Productive work in the trade/vocational schools comes in the form of repairs of buildings, furniture, equipment, and tools in the schools, commercial or service jobs which are accepted in the various workshops from the community such as automobile repair, painting, tune-up, wheel alignment, refrigerator repairs, repairs of radio-television sets, manufacture of school desks, tables, and other pieces of furniture, food preparation, service and catering, hairdos, facilas, manicure and pedicure, making of castings and machining, house plans and designs, building construction,

apparel manufacture, bakery products, and many others. The students actually 'earn while they learn'.

Curriculum evaluation. There is a continuous appraisal and evaluation at all stages in the development of the various curricula. Evaluation starts when the policy frame and preliminary draft are ready. The draft of a curriculum usually includes the rationale for the curriculum as developed and the objectives, which utilize questionnaires to solicit information, comments and suggestions and group discussions, seminars, conferences and workshops for the clarification of broad issues. Components for the re-adjustment and refinement of the draft are also provided.

The second stage in the evaluation of a curriculum takes place when it is in operation, and provides for the assessment in terms of (a) curriculum with consideration for the availability, adequacy and relevance of course materials, (b) achievements and attitudes of students, (c) attitudes and performances of teachers, (d) physical facilities and resources, and (e) administrative attitudes toward problems on communication, institutional development and management.

The final stage of evaluation is made through the graduates of the curriculum. Feedback from them could be useful in the re-organization of policy, refinement of objectives and the relevant components of the curriculum development process. Toward this end, a review and rationalization of technical/vocational education is being made covering:

a) secondary and tertiary, including post-secondary technical/vocational education in both public and private education;
b) non-formal technical/vocational education and training conducted through the Regional Manpower Training Centres, the schools of arts and trades, technical and vocational schools and other institutions;
c) the newly established National Polytechnic System and its component institutions;
d) involvement and participation of private business and industry sectors in technical and vocational education;
e) financing; and
f) employment, manpower demand-and-supply projections, and manpower planning.

Problems of curriculum implementation

Although the curricula in technical and vocational education are, by their design and structure, prescribed so that uniform content and time-allotment are observed in all the agricultural, fishery, and trade schools at the secondary and post-secondary levels, certain divergencies do exist. One of these is the shortage of teachers. The influx of better-qualified teachers to better-paying jobs in other government agencies or abroad has continued to deplete the rank of teachers of technical and vocational education. Stopgap measures as in the employment of young teachers who have had no actual occupational experience in the trades or skills and the employment of undergraduates to serve as instructor aides have been instituted. Teachers also go on leave, resign or retire. In view of this situation, some schools cannot open the courses they desire, and others have to close courses after teachers leave.

While educational policies and objectives are anchored to national development goals and objectives, there are still certain differences in their implementation in that there are differences in interpretation on the institutional, provincial or even regional levels. The categories in which schools offering technical and vocational education curricula fall lead to divergencies. Some are vocational and trade schools; others are units of schools or colleges of arts and trades or even universities which have programmes of industrial education in their set-up. Still others are provincial high schools or are 'barangay' high schools, private vocational schools, technical schools, and the like.

On the other hand, even when schools offering technical/vocational education are close to each other, they often offer similar courses. Under this situation, the spread of equipment, tools and materials in the various schools is such that specialization in the implementation of curricula is not possible. A common practice among schools is that they tend to copy one another's offerings.

Funding is a major factor in that some schools are given more money, enabling them to procure tools, equipment and materials.

Innovations and experiments

Most of the current innovations and experiments are focused on countryside development as a response to the economy's need for balanced urban and rural growth as well as industrial dispersal. Training programmes are made to maximize the utilization of local resources. Attitudinal building is likewise emphasized in the youth in order to make them useful and productive citizens. Built-in placement schemes are provided to ensure the productive employment of trainees. Some innovations:

Capiz Mobile School. This is a joint project of Capiz Institute of Technology and the Provincial Government of Capiz,started in 1973-1974. Its main objectives are to provide trade or agro-fishery skills to out-of-school youth, expand employment opportunities and income of the rural folk and support food and nutrition, health and sanitation, food production and the family planning programme of the government. Among the problems met were: resistance to innovations, insufficient funds, lack of facilities and equipment and difficulty in gathering the teacher members together inasmuch as some live far away. These problems have been partly solved by seeking assistance from civic-spirited citizens of the community and from public and private agencies. Co-operation and interviews, conferences, group dynamics discussions and conversion of a truck into a classroom, which enabled the programme to reach even those far away out-of-school youth, are some of the key features of the project.

Education Center for Young Citizens Producers (ECYCP). A joint project of the Foundation for Youth Development in the Philippines and the Ministry of Education and Culture, the centre is based in Bayambang, Pangasinan. It is aimed at providing out-of-school youth, whose ages range from 15 to 35 years, with educational opportunities for the development of their academic and vocational competencies. The training scheme is extended to the *barrio* communities particularly to acquire income-producing skills and to make literacy skills functional in actual life situations, to apply income-operating productive work, and to train young leaders for action in activities which are development-oriented in the improvement of the local community. Vocational students with specializations in various shop practices are tapped to help the community in the production of self-generating projects.

Fishery Community Development. This project was conceived with the aim of making the curricular offerings of the Mindanao Regional School of Fisheries responsive to actual living conditions in the fishing communities. Through a 'live-in' system in these communities, students are better prepared to become leaders and workers, participating in actual fishing operations and profits, while in turn fishermen learn scientific methods from the students under the guidance of teachers. The dissemination of learning through interaction is done through the schools' lectures, demonstrations, seminars or scientific fishing processes at the campus proper. These are augmented by weekly radio broadcast lessons aimed at the out-of-school youth and adult clientele. Common problems are the inadequacy of technical materials and occasional communication gaps.

Non-formal education for farmers and out-of-school youth. This programme is seen as an integral part of the extension and research institute of the Mountain State Agricultural College, La Trinidad, Benguet Province. It aims to provide a solution to the problem of poor production by training in scientific farming, with farmers and out-of-school youth as its primary target. Some of the innovative features are: (1) pre-training survey as a basis for planning the training courses; (2) planning of the course jointly by the administrator and trainers on the one hand, and the farmers on the other hand; (3) the credibility of the administrator in guaranteeing the loans.

The Green Revolution. Aside from achieving the immediate objectives of increasing the supply of food and neutralizing possible spiralling of prices of basic food commodities, the Ministry of Education and Culture has integrated Green Revolution activities in all subjects at different curricular levels in order to emphasize the development of desirable attitudes especially towards manual labour and dedication to work. The Green Revolution Programme has enabled a great number of students and pupils to participate in food production activities in the schools, in their homes and in the community.

Community development through non-formal education. This project was started in 1972 with the primary purpose of awakening people's awareness to the socio-economic problems affecting their community through the intensification and expansion of the Green Revolution, keeping people continuously involved in the cleanliness and beautification campaign, the expansion of cottage industries, using raw materials found in the community, and strengthening right attitudes towards work. Among the problems tackled were rice production, health and sanitation, communication, school physical plant and community education. The project is timely because it is in accordance with a work-oriented curriculum and non-formal education. Major preparatory measures taken were the establishment of classes, seminars, and meetings to encourage acceptance of the 'do-it-yourself' mentality as opposed to dependence, a survey of the socio-economic needs of the community, the dissemination of informal outputs, and the subsequent adoption of solutions to problems met by the people.

Teacher Education Programme for Rural Development (TEP-RD). Under this programme teachers run co-operative farm projects in school and at home which serve as change agents to accelerate rural development. Instruction is mainly effected through the development of a modularized instruction system. After gaining skills in agriculture, the teachers pass on these skills to pupils, neighbours and friends in their respective schools and communities, and their farm projects serve as concrete models for the people to follow. This programme provides teachers with the opportunity to continue their studies while earning by conducting profitable farm projects to augment their low salaries.

On-farm instruction through foundation-financed student farming projects. The Mindanao State University conceived a scheme whereby funds are made readily available to students to finance their supervised farming projects. This programme aims to undertake services for student farming projects such as extending loans, inputs procurement, storage and marketing. The student farming projects furnish true-to-life laboratory or on-farm practicum for theoretical instruction. They also provide opportunities for needy and deserving students to earn while learning. On top of the profit incentive of the projects, the students gain knowledge in the cultural aspects of crop and animal production as well as the intricacies of loan procurement, co-operative storage and marketing, and record keeping.

Batarisan In-Plant Training Programme

The Batarisan programme is an innovative step to help out-of-school youth to acquire industrial skills, find useful work and enhance their social, moral, and economic well-being. It is a joint project of the NMYC, the *Kabataang Barangay* (KB), and private business and industry where out-of-school youth, particularly school leavers, are given on-the-job training. KB members are trained in such courses as electronics, automotive mechanics, food canning, machine shop operation, wood pattern-making, garment sewing and embroidery.

Special Boat Building Programme (MEC-RDP)

This programme started as a special project of the Ministry of Education and Culture–Reconstruction and Development Programme, and the

Zamboanga School of Arts and Trades, with material support from the private sector. It operates by accepting orders for boat repair or construction jobs either for a fee or free. Apart from profit, this furnishes the students with the needed laboratory practice to complement the theoretical instruction in their trade courses. The programme provides boats to the fishing, transportation and related industries so as to accelerate development in Mindanao. It also provides a nucleus upon which courses in seamanship and midshipman-training are formed. Extension services to small-time fishermen, transportation operators, welders, carpenters, marine engineers, shipbuilders and others have been facilitated. The output of the programme to date includes nine pump boats, three speed boats, two service boats, one *kumpit* cargo boat ranging from 40–80 feet, and glass-bottomed boats for tourists.

The Palawan National Agricultural College (PNAC) Bayanihan School

The PNAC Bayanihan School Programme is a four-year secondary vocational agricultural curriculum. It is a unique educational innovation aimed at providing better learning and training experiences as well as earning and saving opportunities for youth, especially those who cannot pursue higher studies. It is intended to develop a wide base of trained agricultural manpower for national and rural development. Under the scheme, all vocational agricultural subjects are offered 'free' during the first two years. The courses in vocational agriculture are taken by students while they are developing farms in their respective communities. In this way the students 'learn, earn and save' at the same time.

Tower awards

Every year the Technological University of the Philippines awards the Bachelor of Technology to the Ten Outstanding Workers of the Republic (TOWER). Jointly sponsored by the Rotary Club of Manila and the Ministry of Labour, the objectives of the TOWER award are to promote wider recognition of the dignity of labour and to recognize those occupations which are especially relevant to the economic and technological progress of the country. For the year 1979, 12 outstanding skilled workers were selected from such categories of industry as community health services, electronics, automotive, publishing and printing, handicraft, wood products, metal processing, farming agri-business, transportation, petroleum and coal products, food manufacturing and construction.

Trade testing and certification

As provided for in Presidential Decree No. 1572, all services and repair enterprises should be accredited by the Ministry of Trade, and one of the requirements for accreditation is that workers of these shops be tested and certified by the NMYC. The trade testing and certification programme seeks to improve the skill level of workers in industry, to establish bases for determining employment terms and conditions of skilled manpower and to improve industrial relations by providing common grounds for negotiations between employers and workers.

The socio-economic development strategy adopted by the government to sustain the growth of the economy clearly indicates the need to accelerate the development of skilled manpower.

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THE REPUBLIC OF KOREA

by Jeoung-Keun Lee

Introduction

The growth of the economy of the Republic of Korea during the last decade and a half, averaging over 10 per cent a year, has been phenomenal by any standard. During this period, rapidly expanding exports provided the engine for growth and the nation attained significant progress in many industrial areas. However, recent external developments such as the growing protectionist mood on the part of industrialized nations, emerging resource nationalism, and sharpening competition with latecomer developing economics in export markets, all seem to indicate the need for the formulation of a new set of development strategies and targets.

The single most important source of growth for the country's economy is its highly-motivated and well-trained labour force. An adequate supply of skilled manpower can be secured to meet the requirements of rapid economic expansion as long as the Republic of Korea continues to place importance on technical manpower development and the raising of educational standards. In this respect the Republic of Korea's education system has contributed to industrialization by emphasizing the widespread provision of basic education (primary and general secondary) and vocational training at the secondary level. Universal enrolment of the primary school age group was achieved by 1970 and about 75 per cent of the secondary school age group was enrolled by 1978.

Priority was also attached over the last decade to expanding training capacity for industrial workers at technical high schools and vocational training institutes. Between 1970 and 1978, secondary enrolments in vocational fields more than doubled (to 615,000) and accounted for 42 per cent of total secondary enrolments. In addition, some 5,000 grade IX school leavers (this figure is expected to double by 1981) attend one- to two-year skill training courses at vocational training institutes. As a result of these programmes, the needed training capacity for skilled workers has largely been met.

Industrialization has in the past been based largely on the exploitation of well-established, imported technologies and a supply of productive, inexpensive labour. The technologies used were often developed 25 years ago or earlier, and were relatively simple, requiring few sophisticated skills. Industry was thus able to expand without extensive research and development costs or a great need for high-level technical manpower.

It is now time to shift the economic development strategy from labour-intensive towards more skill-intensive manufactures. This strategy is necessary to maintain a comparative advantage in international trade, in view of the expected increase in competition from developing countries with lower wage levels than those now prevailing in the Republic of Korea, and protectionist restrictions in industrialized countries, which will work against increasing imports of high-volume and low-value-added goods. If this industrial strategy is to be successful, the Republic of Korea must increasingly replace wholly-imported technologies with locally-generated and adapted technologies. To do this it must reinforce its capabilities in product and process engineering.

The planned structural transformation of industry also necessitates changes in the composition of the work force to match manpower supply and skill development with demand. Effective operations using sophisticated production technologies require a higher quality of present skills,

a broader range of skills and a greater proportion of highly-skilled technical manpower in the labour force.

Technical manpower training

The formal education system of the Republic of Korea comprises a basic six years of compulsory primary education followed by three years of middle school and a further three years of high school–either academic or vocational. High-school graduates then have the options of entering industry, a two-year junior college, a four-year college or university. In addition there are a number of other mainly private institutions offering different educational options which have developed over the years in response to industrial and other labour needs.

Technical/vocational high schools. The vocational high schools which provide agricultural, commercial and technical education account for more than 40 per cent of the enrolment for the whole of the second level. The total number of vocational high schools is 580, with an enrolment of 674,000 students. These figures are compared with the academic high schools which number 1,300, with 1,565,000 students. Vocational high schools grew particularly fast during the early 1970s but the growth rate has reached a plateau. The recent upsurge of interest in technical education was a response to the relative importance of its role in accelerating national development. The government has made special efforts to increase the capabilities of technical/vocational schools to serve the developmental needs of the nation.

The total number of technical/vocational-high schools is 95 (54 public and 41 private), offering a total of 180,000 places in the mechanical, electrical, construction and chemical engineering fields covering 12 occupational clusters. If technical courses in comprehensive high schools and other vocational schools are included, this figure goes up to 126 schools with 194,000 student places.

Entrants to technical/vocational high schools come from among graduates of middle school (after receiving nine years of formal education). They are required to take a preliminary examination administered at provincial level. This system is designed to screen high-school applicants both for academic and vocational high schools. Although the same examination applies to the two streams, candidates for vocational high schools are screened separately so that successful examinees at the preliminary examination are entitled to another round of tests given by industrial vocational high schools. Those who fail in the main selection test are given a chance to enter academic high schools without examination, as chosen by a lottery assignment system. Thus the system reflects an attempt to channel more able students into vocational high schools.

The curriculum of the technical/vocational high school consists of general subjects and technical subjects in a ratio of 30:70. The latter give equal weightage to theory and practice. The minimum number of course units to be completed during the three-year duration is 204. One unit is equal to 18 hours, or one 50-minute hour per week for 18 weeks. In general the first grade (grade X) is devoted mainly to learning general subjects, and technical subjects occupy proportionately greater time the higher the grade. Before graduation, all students are required to complete in-plant apprenticeships ranging from one to three months.

The technical/vocational high school students stand a better chance for scholarships and other financial assistance than their counterparts in academic high schools. In particular those who hold skill certificates are entitled to scholarships. Tuition exemption is also available in proportions ranging from 10 to 50 per cent, according to the type of school.

Graduates of technical high schools are favourably considered when it comes to military service. In other words, those who are employed by defense industries can defer their military draft up to the age of 22. If they obtain skill licences in their respective areas during this period, they are granted the status of reserve forces.

Special consideration is given to technical high-school graduates who aspire to higher education, providing that the areas they want to study indicate the continuation of their studies in technical high schools. Although they are required to take the national preliminary examination, they are screened separately from the graduates of academic high schools. In particular, the graduates possessing grade II licences are subject to a special screening procedure which exempts them from the normal route taken by other entrants.

Junior technical colleges. Technicians are trained in the Republic of Korea in two ways. On-the-job training for workers having a high school background is one source and training in institutions is another. The main source of technicians, however, is the junior technical college, although a number of technician-level posts are also filled by graduates from four-year colleges. The junior college system is likely to be the principal source of technical manpower in the future.

The Junior Technical Colleges (JTC) offer a two-year post-high-school education with the purpose of producing middle-level technicians. There are 40 JTCs (out of 127 junior vocational colleges) enrolling 50,578 students (of 110,145 students enrolled in all vocational colleges). In recent years, there has been an increase in the number of JTCs, especially of private ownership, as industrial firms are encouraged to establish them to meet their own needs.

Entrants to JTC are mainly graduates of general and vocational high schools. They are required to pass the national preliminary college examination. The final selection for entry is based on high-school credentials and preliminary examination scores, without requiring a written examination. Skilled workers who possess a grade II licence are exempt from the national preliminary examination, and their entry accounts for more than 30 per cent of the quota. Graduates of vocational high schools with three or more years of experience can be admitted to evening courses without examination, provided that their credentials are within the upper half of the total achievement range and their applications for entry are endorsed by their employers.

The two-year programme covers 120 credit hours, the minimum requirement being 90. Of special significance is a pilot programme presently carried out by Gyung Gi Junior Technical College which groups entrants separately during the first year so that they may receive remedial instruction in those subjects in which they may be deficient–that is, science, mathematics and other general subjects. A more extensive application of this programme will depend on the results of the trial operation.

The curriculum is composed of general studies and specialized studies in the approximate proportions of 20:80. The former includes Korean language, English, physical education, science and military training, and the latter covers theory and practice in the technical field. Subjects in the specialized section of the curriculum are divided into major or compulsory subjects and elective or non-compulsory subjects.

With the rapidly rising demand for technicians, graduates of junior technical colleges do not experience much difficulty in obtaining employment. Only a few (9.55 per cent) advance to the next stage of education. Transition is not easy, since the quota is closely controlled.

Non-formal technical training. Non-formal vocational training is carried out in Technical/Vocational Institutes (VTIs) under the aegis of the Administration of Labour Affairs (ALA) and through on-the-job training within industry. The VTIs offer mainly one-year skill-training courses in centres which are being specifically equipped and staffed for the purpose. Arrangements are flexible, however, and can provide a variety of courses for retraining, induction, upgrading, supervising and other purposes–they can also be more readily changed in response to changes in the industrial structure. In all, they are more cost-effective for lower skill development than the technical high schools. A survey has shown that, for the lower skill occupations, a good many employers prefer middle-school graduates who have had one year in a VTI,or academic high school graduates with a year of on-the-job training, to the technical high school graduates. They prefer the latter for the higher skill posts however.

The control of VTIs is to go to boards on which both industry and government will be represented. This will lead to greater flexibility in organizing the training, in higher salaries being awarded to staff and in far better co-ordination of training in relation to manpower needs. It may also encourage industrial, financial and other assistance. The training of instructors is carried out at the Central Vocational Training Institute.

VTI trainees will account for about one-fifth of the skilled manpower requirement which is the ALA's responsibility within the fourth Five-Year Plan, with the remainder coming from 'in-plant' training. The Vocational Training Law requires that all firms with 200 or more employees provide training for up to 10 per cent of their total employees. Programmes of from 3–18 months' duration are envisaged, covering basic training, upgrading, retraining and adaptation training. Firms who do not provide such training will be required to contribute to an industrial training levy. The ALA is to determine the basic per-trainee level of expenditure for each type of firm and occupation. Enterprises will then be taxed on the amount they should have spent on training had they carried it out. The money will go to in-plant or group training schemes, perhaps on a grant-in-aid basis, or to bolster VTI expenditure. The ALA is to prepare manuals and guides for in-plant training.

Technical teacher education. As in so many developing systems of technical education, the lack of adequate numbers of well-trained and experienced technical teachers is a major obstacle to rapid progress in this field in the Republic of Korea. Reference has been made repeatedly both in the Ministry of Education and in the institutions themselves to this shortage, as well as to the fact that teachers often seem to lack industrial experience, competence in laboratory and workshop activities, and training in modern pedagogical methods. These problems are compounded by the overcrowded laboratories and workshops found in many institutions, by an almost complete absence of assistance in the shape of laboratory technicians, and by shortages of equipment.

There are two main sources of technical teachers. First, there are 11 university departments of industrial education, which include pedagogy and a craft/skill element in their normal engineering curricula over a period of four years. Successful graduates from these departments immediately qualify for teacher grade II and a senior technician's licence. They are exempted from the tuition fee, but are required to give a minimum of five years of service. Then there are arrangements whereby graduates in engineering and science can include studies in pedagogy, amounting to 16 credits, and thus also enter schools as teacher grade II. Additionally, engineering graduates may, with the Ministry approval, join a technical high school without any pedagogical training. In this case they enter at the grade-III stage. Apart from these arrangements there are also a number of in-service and upgrading courses.

It has been decided to concentrate the work in a single university because of some disadvantages in former arrangements. Thus the responsibility for technical teacher education is to be vested in Chung Nam University, where the School of Engineering is to be transformed into the School of Industrial Education. On the question of numbers, the output of technical high school teachers will be 475 once the four-year course has been established and allowances made for military service, against an annual need up to 1981 of 976, making no allowance for attrition; or from 1981 660 per annum, again regardless of unfilled needs.

Curriculum development

In the past, curriculum development was the responsibility of the now-defunct Textbook Compilation Bureau within the Ministry of Education (MOE), assisted by its Curriculum Deliberation Committee. The major weakness of this system was that research activities were not effectively linked to curriculum development, with a resultant lack of consistent input of research results into curriculum reform.

The lack of professional research capability on the part of the MOE led to the necessity of delegating such work to a research institute. This led to a meeting between the MOE and Korean Educational Development Institute (KEDI) in February 1979, whereby the roles of the two were clarified. As a result, KEDI came to be responsible for the designing and development of curricula and textbooks and basic studies related thereto, while the MOE was charged with overall planning and co-ordination, which includes work-scheduling, preparation of guidelines, organization of advisory committees, and implementation of policy measures for administrative support. To meet its new responsibility, KEDI created a Department of Curriculum Development staffed with 90 researchers representing a wide range of relevant fields. In order to increase its professional capability, KEDI is assisted by a Curriculum Development Committee, composed of professionals drawn from outside.

Curriculum revision in the Republic of Korea occurs on a six-year cycle. In accordance with the division of functions, the Ministry of Education takes the responsibility for overall planning and co-ordination, and the ultimate responsibility for developing the school curriculum lies with KEDI. In contrast with the previous method, the institute's approach to curriculum development is research-based, which in general follows the stages given below.

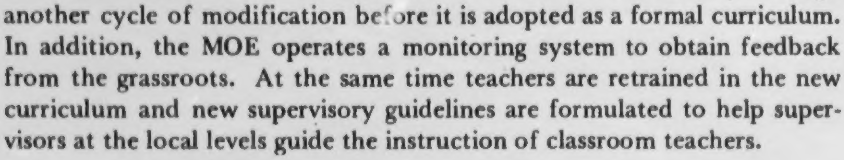
1. Basic studies, including philosophical studies on educational goals, analysis of national and societal needs, and studies on the growth of the country's children;
2. Formulation of specific guidelines for curriculum development and articulation of educational goals by school level;
3. Specification of educational objectives by grade and area of learning;
4. Selection and organization of curriculum contents and subject matter syllabuses;
5. Development of textbooks and instructional materials, including clinical evaluation;
6. Try-out in pilot schools; and
7. Modification and preparation of curriculum draft.

Evaluation is built in at each stage so that judgemental and clinical data are collected throughout the total process. The curriculum draft prepared by KEDI is submitted to the MOE's Curriculum Deliberation Committee for final review. The process of review is supplemented by public hearings which attempt to reflect the opinions of the public as well as of the teachers. On the basis of their results, the draft may undergo another cycle of modification before it is adopted as a formal curriculum. In addition, the MOE operates a monitoring system to obtain feedback from the grassroots. At the same time teachers are retrained in the new curriculum and new supervisory guidelines are formulated to help supervisors at the local levels guide the instruction of classroom teachers.

It takes six years to go through a cycle of the aforementioned stages. One year is devoted to curriculum designing and another year to the development of subject matter syllabus. This is followed by the development of textbooks and instructional materials which takes two years. Subsequently, one year is given for field try-out and teacher retraining followed by modification and refining of one year's duration. The curriculum development starts with the elementary level and moves on to the middle- and high-school levels, with two-year intervals between levels.

Within the framework of the general approach, the procedure for developing the industrial arts curriculum follows the five stages shown in Figure 1.

Figure 1


Definition of educational objectives
Selection and organization of contents
Curriculum materials development and dissemination
Teaching and learning
Evaluation

The third stage includes the development of textbooks, teaching guides, student's work guides and specification of standard facilities and tools. In the fourth stage, these are tried out in actual classroom situations, followed by the evaluation of the tryout results. In addition, retraining of teachers has become an essential element of curriculum development.

The National Skill Certification System

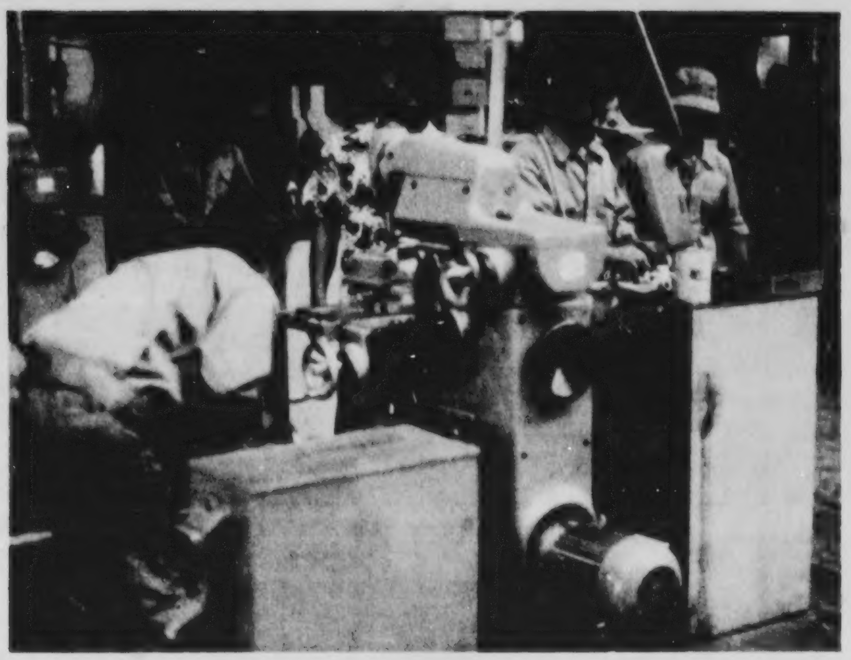
The National Skill Certification System came into existence in 1973, with a view to standardizing skill performance competencies and raising the relevancy of educational programmes to industrial needs. It was also designed to serve as an incentive for those aspiring to pursue vocational education.

Realizing the importance of the skill certification system as a means of stimulating human resources development, efforts were made to incorporate the then-existent practices into a single system. As an initial step, a legal provision was enacted in 1973 to provide for a more systematic and efficient implementation of skill certification. In 1976, an institute exclusively responsible for research and development activities called the Korean Skill Conference Corporation was established. In simple terms, the national certification system is a means of qualifying those who have reached certain stages of proficiency in skills performance as technicians or skilled workers at differentiated levels. The specific objectives of the system are:

1. To improve the quality of technicians and skilled workers and increase their accountability;
2. To raise their socio-economic status;
3. To serve as a means of increasing the relevancy of vocational education to industrial needs; and
4. To standardize skill performance criteria in a way that supports the national policy for industrialization.

In the long-term, this system is aimed at eventually rooting out the social norms which denigrate skilled work and creating a social climate in which it is respected.

As shown in Figure 2, there are three categories of technical manpower—namely, scientists, engineers and skilled workers. The highest level of each category deserves the same treatment. Thus for the remuneration scale, the salary of scientists is on a par with those of professional engineers and master craftsmen. Entry requirements vary: engineers are college graduates; technicians are junior college graduates; and entry for craftsmen requires the completion of vocational high school education or occupational training. (Figure 2 appears on page 200).



In order to understand the system, it might be helpful to define each level in terms of competency required.

Professional engineer: Possessing high-level knowledge and skill performance experience, able to design, research, analyse, manage and evaluate production methods

Grade I engineer : Possessing engineering knowledge and the ability to apply it

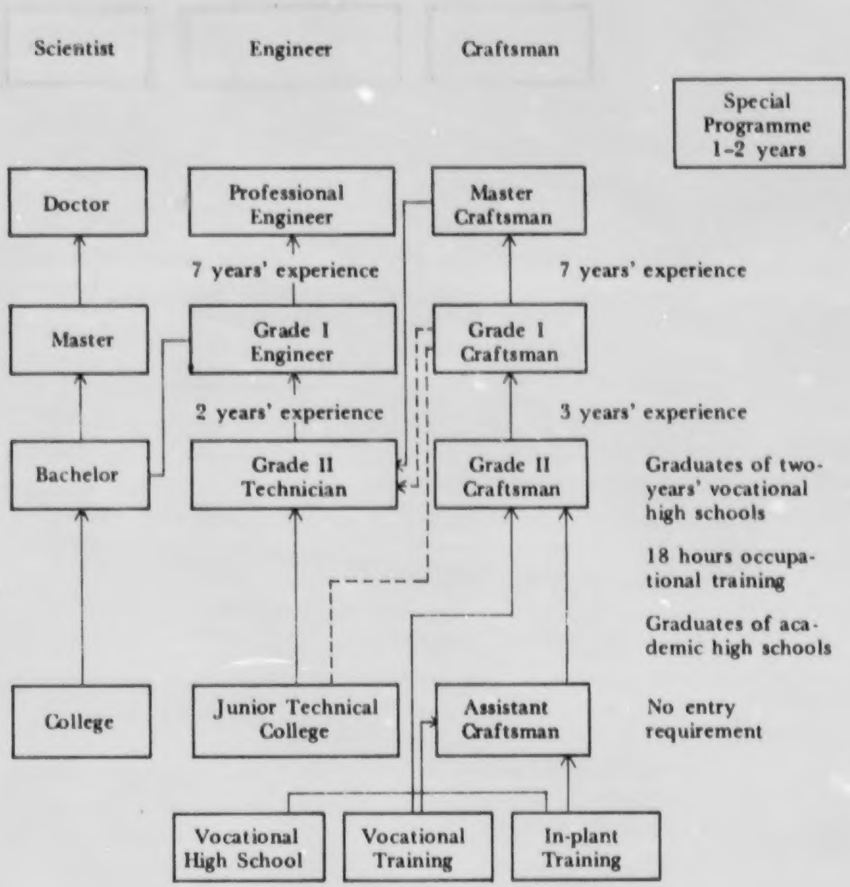
Grade II engineer : Possessing basic engineering knowledge and the ability to apply it

Master craftsman : The highest-level craftsman, able to work as production manager or supervisor

Grade I craftsman : The highest-level craftsman, possessing production skills and playing leading roles in equipment operation and maintenance and quality control

Grade II craftsman : Able to carry out production work under the supervision of skilled workers.

Figure 2. Structure of the National Skill Certification System


Scientist
Engineer
Craftsman
Special Programme 1-2 years
Doctor
Professional Engineer
Master Craftsman
7 years' experience
7 years' experience
Master
Grade I Engineer
Grade I Craftsman
2 years' experience
3 years' experience
Bachelor
Grade II Technician
Grade II Craftsman
Graduates of two-years' vocational high schools
18 hours occupational training
Graduates of academic high schools
College
Junior Technical College
Assistant Craftsman
No entry requirement
Vocational High School
Vocational Training
In-plant Training

Categorization of technical high schools

The major innovation in technical education in the Republic of Korea is the categorization of technical high schools. In order to effectively respond to the increasing demand for skilled workers, technical high schools were grouped into four categories on a priority basis, with their functions respectively specialized. They are mechanical high schools, demonstration technical high schools, specialized technical high schools and general technical high schools. The mechanical high schools, which produce precision machine workers, rank first in the priority order of the government's administrative and financial support. The demonstration technical high schools produce skilled workers to fill manpower requirements for the country's industrial firms abroad. The specialized technical high schools specialize in electronics, steel manufacturing, architecture or railroad maintenance. The general technical high schools produce skilled workers in overall skill areas. The Government of the Republic of Korea has formulated a plan to provide for an incremental expansion of investment in technical education according to its priorities.

Mechanical high schools. By the very nature of precision machine work, it is imperative that the training programme for this skill be distinct from others. First of all, it requires the mastery of sophisticated skills on a solid theoretical foundation. In 1973 four technical high schools conducted training for precision machinery workers on a pilot basis, which yielded fruitful results. Subsequently, more technical high schools were converted to mechanical high schools, bringing their total number to 19. These schools enrol a total of 4,560 students each year. By 1981 there will be a total of 21,900 precision workers coming through this channel.

The first step in developing the mechanical high school was to expand shop facilities. New standard criteria for shop facilities and equipment were established, which required each school to have a separate shop for each kind of equipment. There are shops for lathing, milling and grinding in each mechanical high school. By contrast, the general technical high school is permitted to have one shop housing different kinds of equipment. A plan was formulated to provide for an incremental investment in the shop facilities of mechanical high schools beginning in 1973. The expansion of shop facilities was accompanied by a substantial increase in the practice fee, for which the government subsidizes an increasing proportion.

The curriculum, as seen in general technical high schools, comprises a general education course (30 per cent) and a technical/vocational course (70 per cent). The mechanical high school assigns 80 per cent to shop practice in technical courses. In addition to the basic theory of machinery, students are exposed to precision measurement, quality control and precision processing. The first-graders are required to master basic skills, which amount to 800 hours. The second- and third-graders complete 1,600 hours of shop practice in advanced skills, which qualify them as grade II certified precision machine workers.

The students of mechanical high schools enjoy more incentives than their counterparts in other technical high schools. First, more than 50 per cent of the enrolled are exempted from tuition. The second incentive is a general scholarship available to those who demonstrate outstanding performance of skills in skill competitions and certification examinations. The third is in the form of a special allowance available to those certified as precision machine workers. The fourth is a guarantee for employment after graduation.

Demonstration technical high schools. The demonstration high school is the outgrowth of the urgent need for well-trained skilled workers to work abroad. As the Republic of Korea's construction companies expanded their markets into foreign countries, especially in the Middle East, the demand for skilled workers in this field rose sharply. In 1976 the government designated 11 technical high schools with relatively good shop facilities as responsible for producing 2,140 skilled workers to fill job requirements abroad. Skill areas covered included machine assembling, metal work, welding, plumbing, electricity, architecture, civil engineering and construction work. These schools have produced nearly 2,000 workers annually. The trainees were selected among third-graders of outstanding achievement and received six months' intensive training tailored to specific needs. Shop facilities were expanded, and old equipment was brought into a serviceable condition by teachers and students. There followed a marked increase in practice fees, part of which was borne by the construction companies, which are major employers of skilled workers.

Of special significance was the publication of up-to-date shop practice textbooks for use in this training programme in 1976. For their development alone, the government contributed $125,000. Text development work was a group endeavour of government officials, teachers, engineers of consuming companies and professionals. The new textbooks, which show students how to become licensed craftsmen in various skills, are notable for up-to-date content, sequenced presentation of work procedures and provision for self-evaluation of performance.

The six-month training for selected students, which requires 800 hours of intensive, small-group instruction, is an addition to the existing curriculum. A major strength of this training programme is the co-operation between school and industry, whereby the programme caters to industrial needs and thus increases its effectiveness. Above all, cost-saving was made possible by drawing upon the resources of industry. As a result, shop practice was carried out to the fullest degree. Those selected for this training enjoy higher employment prospects and better salaries commensurate with the additional training they have undergone. Certified craftsmen bound to foreign markets are exempted from military service.

Specialized technical high schools. In order to keep up with the growing sophistication of skills, the areas where the cutting edge of development needed to be sharpened but little increase in manpower demand was expected were identified as (a) electronics, (b) chemical engineering, (c) construction and (d) railroads. Subsequently, nine technical high

schools were selected to concentrate on one of these areas, while keeping in balance with other areas. The selection of schools was based on the unique needs of regional communities and the existing industrial facilities located nearby.

Nine technical high schools have had their programmes specialized. To facilitate the expansion of shop facilities of public schools, the government bears 50 per cent of total expenditure, and provides support to private schools in the form of subsidy.

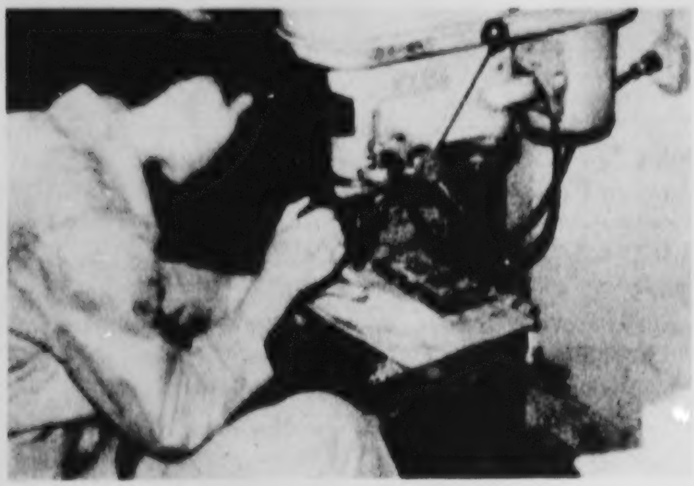
General technical high schools. Efforts have been made to streamline general technical high schools, while holding down their numbers to the present level. At the same time, measures are taken to encourage the participation of industrial firms in technical education by taking over poorly-managed schools. For the improvement of shop facilities in the general technical high schools, the government plans a phased increase of financial support by 1981.

Evening classes. Evening classes have been operated by technical high schools since 1970, in order to enlarge opportunities for employed youngsters to continue schooling. There are at present six schools offering evening classes equivalent to high-school level. The aims of educational programmes in the evening classes are to increase the skill competency of employed youth and to enhance their motivation for continuing to learn.

Admission into evening class requires graduation from middle schools, with the maximum age limited to 18. Those who have won awards in international skill competitions and licensed assistant craftsmen are given priority for admission. Graduating from the three-year course gives them a qualification equivalent to that of graduates of technical high schools.

The curriculum of the evening course places emphasis on general subjects by assigning them 60 per cent (as compared to 40 per cent) of vocational or technical subjects. Programmes at grades I and II are largely comprised of shop practice.

The intensive support for technical high schools on a priority basis will help to enhance the quality of technical education and make it responsive to the specific needs of industry. The active participation of private industry will cut down educational costs by promoting a reciprocal partnership between school and industry.



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Bulletin of the Unesco Regional Office
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SINGAPORE

by P. Sydall

Introduction

For nearly 150 years of its history, Singapore depended upon its entrepot trade. Until the mid-1960s, commerce and other activities associated with trading formed the main source of occupation for its people. The need to diversify into other industries and activities to provide employment for the growing population and to move into the new economic fields of the 1960s became a matter of great importance. To maintain a regulated population growth, family planning was introduced and emphasized.

Singapore's new economic strategy was for an export-oriented economy, which meant expanded manufacturing. A significant development after the mid-1960s was the growth of a better worker-employer relationship which has contributed to better understanding between labour/management and the government. This tripartite alliance–between labour, management and the government–remains today the cornerstone of industrial relations.

By 1972, Singapore had reached full employment. Yet this success in providing jobs for all created new problems. People became more affluent, workers more difficult to get and 'job-hopping' soon became the familiar complaint of management.

Singapore's economy in 1972 was largely dependent upon foreign investments attracted by the excellent infrastructure offered in the Republic, and by the low wages of the workforce, particularly in the unskilled or semi-skilled category. It was then time for Singapore to take stock of its position and to compete with industrialized nations in industries that are not affected by high workforce requirements. To do this, the country had to upgrade its technology and skills.

This change could not be made overnight. It was not until mid-1979 that the government decided to impose measures that would effectively phase out labour-intensive industries in favour of high-technology industries and increased productivity. Labour-intensive industries that continue to survive are required to meet the costs of paying for skill development and higher technology. The effects of these developments and changes in government policies on economic issues are seen in the changes in the education system in Singapore, and especially in vocational and industrial training.

Primary education

Formal schooling begins at the age of six, and primary education lasts six years for the standard course. An examination at the end of the sixth year, or Primary Six, decides whether the child enters a secondary school. This Primary School Leaving Examination (PSLE) is the first major experience a child encounters. It is a source of anxiety and concern for most parents as the importance of obtaining a secondary education in Singapore remains vital to most and is synonymous with a 'good career' in later life.

Education is not compulsory and at primary level it is free. Under the New Education System (NES) introduced in 1979, the objectives of primary education have been defined to be:

1. **Bilingualism**: this is to enable the above-average and average pupils to be proficient in English and to be at least literate in one other language.
2. **Literacy**: pupils who cannot cope with two languages should be literate in one language. As a general rule, this will be English for ethnic Malay and Tamil pupils and Chinese for ethnic Chinese pupils.
3. **Moral education**: all pupils are to be taught desirable moral and cultural values consistent with a multi-racial, multi-religious and multi-cultural modern Singapore.
4. **Catering for differences in abilities**: the education system is to take into account the variance in intellectual ability among children and to make allowances for them to proceed at their own rates of progress. This is aimed at reducing educational wastage to the minimum, thus increasing efficiency to the maximum.

The NES emphasizes language skills and incorporates a system of streaming at Primary Three level and upwards into one of three alternatives:

1. The Normal Bilingual Course
2. The Extended Bilingual Course
3. The Monolingual Course.

From Primary Three onward, any child who fails the annual assessments will be channelled into either the Extended Course or the Monolingual Course. The Extended Course provides eight years of primary schooling, or an additional two years over the Normal Course. The Monolingual Course provides eight years, after which the child may move into a vocational institute for vocational training.

There has been some concern that the monolingual-stream graduates will cause a significant influx into vocational training. This low-calibre influx into the industrial market at the later stage revives the myth that industrial training is suitable only for the backward and academically-poor school-leaver. With advances made in technology and the constant improvements made in the field of industrial processes, it is difficult to reconcile the two. However, it is expected that these monolingual school-leavers will be more literate and have better numeracy skills as a result of their extended primary schooling through a specially-designed syllabus that concentrates only on one language. They are likely to adapt quickly to certain types of training which require manual rather than intellectual skills.

Secondary education

Secondary education is of six years' duration and consists of two years at each of the lower-secondary, upper-secondary and pre-university levels. At the lower secondary level, all schools follow a common curriculum. Two languages are studied, together with a combination of other subjects, making a total of nine subjects. Additionally, all boys and some of the girls attend workshop sessions one day a week for one-and-one-half-hours.

At upper-secondary level, pupils take five compulsory examination subjects and four non-examination subjects. The compulsory subjects are the first and second languages, mathematics, a science subject and either literature, geography or history. Pupils in technical schools take a workshop subject in place of either literature, geography or history. At the end of the second year pupils sit for the General Certificate of Education 'Ordinary Level' (GCE 'O'). Most leave school at this stage and either seek employment, enrol in vocational or technical institutes or enlist in the National Service.

Pre-university is open only to those who have scored well in the GCE 'C' examinations and have attained the requisite number of 'points' for entry. There are about 20 elective subjects which may be offered in various combinations for the science, arts and commercial streams. At the end of the course, pupils sit for the GCE 'A' levels in four subjects and a General Paper.

Higher education

Apart from the Singapore University and the Nanyang University, other tertiary institutions provide technical education of relevance to industrial occupations.

Singapore Polytechnic. The Singapore Polytechnic offers technician diploma courses in civil, electrical, electronics and communications, mechanical production and marine engineering, and building and chemical process technology. It also provides for technician certificate courses in architectural drafting, aeronautical maintenance engineering, maritime radio-communication and various other courses for nautical studies. It conducts numerous short supplementary courses for seamen and marine engineers, including land surveying, structural engineering, ship construction and works management. These are normally conducted on a day-release basis or in the evenings. Admittance into full-time and part-time courses is generally based on GCE 'O' level passes in relevant subjects including English language, and credits in mathematics and an appropriate science or technical subject. Applicants for part-time and pre-sea courses without academic requirements may sit for an entrance test in any of the three required subjects. Part-time applicants must, in addition to the academic requirements, be in employment relevant to their applied courses of study. In the 1977/78 session there were 8,366 full-time students and 3,262 part-time students.

Ngee Ann Technical Institute. Established in 1963 to provide technical education for the Chinese stream, this college provides technician diploma courses in mechanical engineering, electrical and electronic engineering, shipbuilding and ship-repairing technology, building maintenance and management as well as a diploma course in business studies. Enrolment in the 1977/78 session was 2,269 students. The college has established an academic link with the Central London Polytechnic, and its diplomas awarded in association with that establishment have gained recognition both in Singapore and overseas.

Singapore Technical Institute. This Institute, established in 1969, provides training at Industrial Technician Certificate (ITC) level. Courses are of two years' duration. The Institute provides courses in mechanical engineering, mechanical engineering drawing and design, air-conditioning and refrigeration, and electrical and electronics engineering. Up to 1974 it was the only institute conducting industrial technician certificate-level courses but since then other institutes offer ITC courses also. Admission into its courses is restricted to GCE 'O' level graduates except for the electrical and electronic courses which accept graduates of the one-year trade courses in electrical fitting and electronics servicing. The Institute is administered by the Vocational and Industrial Training Board.

University of Singapore. The University was established in 1962 and is a successor to the University of Malaya. It has seven faculties and three schools; namely the Faculties of Arts and Social Sciences, Law, Science,

Medicine, Dentistry, Engineering, Architecture and Building, and the Schools of Accountancy, Business Administration and Post-graduate Dental Studies. In addition, the University has a Department of Extramural Studies which provides a wide range of part-time courses under its continuing education programme. In line with the economic development trends in Singapore, the University has modified and revised courses in economics and statistics, the latter being taught as a separate principal subject up to general degree level. In 1979 the honours course in statistics was combined with that in economics. Economics is now a full science subject in the Bachelor of Science general degree course. Science graduates who have read economics can now take on executive, administrative or managerial positions. In the academic year 1977/78 there was a full-time enrolment of 6,393 students.

Nanyang University. Nanyang University, established in 1956, has three faculties: Arts, Science and Commerce, as well as a College of Graduate Studies. It offers courses leading to the Bachelor and higher degrees in arts, science and commerce. Originally intended as a Chinese-medium university, it has since changed its policy in this direction and many of its courses are currently conducted in English. In the 1977/78 sessions there were 2,130 students enrolled.

Educational reforms

Education came under critical public notice when it was realized that a large component of the men in the Singapore Armed Forces were near-illiterates and had little or no proficiency in either English or Chinese (Mandarin). While technical education was a major concern of the 1960s and the 1970s, language education has since replaced this in importance. This led to the restructuring of primary and secondary education in 1978 and 1979 under what is known as the New Education System (NES).

One of the most significant developments in the late 1970s was the implementation of the Basic Courses and the Junior Trainee Scheme. These two schemes were designed to channel premature primary-school leavers into vocational training courses so that they could be gainfully occupied in skilled jobs and thus help to alleviate the labour shortage in the Republic. This shortage is particularly evident in the building-construction and ship-building and repair trades, both 'hard' trades that few wish to join.

The Basic Course

The Basic Course was intended to provide the academically-poor pupils from the primary schools with a parallel system of education pruned down to basic subjects of language, mathematics, moral and civic education and craftwork which were taught in special classes in the primary schools. The pupils are also exposed to simple workshop activities or home economics. The curriculum is planned to inculcate proper work attitudes and habits and to develop the pupils through modified syllabi in the skills of conversational English. This is to prepare them for entry into the Junior Trainee Scheme.

The first batch of primary-school pupils was admitted in 1977 and numbered 3,418, comprising 2,736 males and 682 females. The pupils were divided into Basic 4 (1) comprising all those 14.5 years and above and Basic 4 (2) comprising those below 14.5 years. Basic 4 (1) students were channelled into the Junior Trainee Scheme in July and the rest in December.

The Basic Courses provide the less academically-inclined with an alternative form of education. These pupils have not left the school system and parents, although possibly not pleased that their offspring were not able to make the grade into the secondary education system, are nonetheless relieved that they are not released from the custody of the school system. Further, however modified the programme of learning, the pupils in these courses are provided with tuition and an opportunity to develop further.

The scheme, however, has not proved popular with the pupils or the staff teaching them. To the pupils, these courses are merely another form of primary schooling with which they had been unable to cope. They see their lessons in English, basic arithmetic and a second language as uninteresting versions of their primary school experiences. There is also the social stigma of belonging to a segregated sector of the educational system.

Although the schools are able, together with the co-operation of parents, to retain most of the pupils through the first years of the Basic Courses, dropouts are frequent. It is the prospect of securing a job through the Junior Trainee Scheme that prompts many to remain.

To the staff, there is the frustrating duty of trying to educate pupils that are slow to learn and difficult to discipline. A great deal of ingenuity is called for to devise attractive and interesting lessons to keep the classes intact. There is also the inevitable comparison of themselves with their colleagues teaching the normal primary classes.

It will take more than encouraging words to stimulate staff to teach these special groups. Yet the Basic Course performs one very valuable and important function in that it provides for the temporary retention of pupils until they can be placed into the Junior Trainee Scheme.

The Junior Trainee Scheme

Perhaps the best innovation of the 1970s is the Junior Trainee Scheme (JTS). Employment in Singapore is controlled by the Employment Act of 1968 and the subsequent amendments. Persons of the age of 16 years may be employed as adult workers and they enjoy all benefits and rights as applicable to them under the various acts such as the Employment Act, the Industrial Relations Act and the Workman's Compensation Act.

The Employment Act, in particular the articles on the employment of young persons, was amended in 1976 to make way for the Junior Trainee Scheme the following year. The Regulations governing the Employment of Children and Young Persons, 1976, allow young persons to be employed in approved apprenticeship schemes under the charge of the then Industrial Training Board.

Young persons employed under the JTS are not required to obtain written approval of the Commissioner. Children between the age of 12 and 14 may be employed in light work in a non-industrial undertaking. Children under 12 years of age are not permitted employment.

Under the Junior Trainee Scheme, the young workers must be registered with the Vocational and Industrial Training Board (VITB). They may be either in a training scheme or in gainful employment. The duration of the Scheme is three years or, for males, up to the time of enlistment in the National Service, whichever is the earliest. Thus in the interval that lapses between the time primary-school pupils leave the education system and the time they reach 18 years (which for the majority of males is the age of enlistment), the youth are emplaced in a relevant, useful and gainful employment either as trainees or as young employees.

The training schemes are short, usually not more than from three to six months, and full-time in a centre or off-the-job training to acquire basic working skills, followed by full-time employment under a contract of service with the employer, during which time the junior trainee attends day-release classes under the extension education programme.

Trainees enrolled in training schemes receive a training allowance of between S$50 and S$100* per month depending upon the sector, the employer and the nature of the work. Thereafter, trainees are paid wages that are 50-70 per cent of adult workers' wages, rising to a level comparable with adult wages in the latter months of the scheme. Throughout the duration of the scheme, officers of the VITB monitor the progress and welfare of the trainees and attend to any irregularities that may occur between the trainee and the employer. Response to the scheme has been encouraging. In 1977, a survey of firms and government organizations indicated that there were over 6,000 places available for the trainees. It has proved to be a definite step in the right direction, preventing as it does a large number of youths, particularly males, from being unemployed and left to their own devices until old enough to find a job themselves. From 1977 to the first quarter of 1979, over 4,000 trainees were enrolled, of which 1,690 accepted training. The remainder were placed in employment.

The scheme has been a boon to the construction industry in particular. Nearly 2,000 trainees have enrolled in the Joint Construction Training Schemes with the Housing and Development Board (HDB), the Public Works Department (PWD) and private building contractors. In this way young school leavers enter the labour force at a much earlier age, and many employers regard this as one solution to their labour recruitment difficulties. Furthermore, trainees are under a contract of service which makes them liable to refund as liquidated damages to the employer part of the expenses incurred as training costs. The VITB regulates this liability and has kept it to a reasonably small sum of $400. This discourages leaving employment on frivolous grounds.

Frequent monitoring of trainees under the scheme provides them with a means of having their grievances heard. Management too, is able to translate its policies more effectively through the medium of the counsellor, and it is significant that very few trainees develop difficulties within their place of work as a result.

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* Approximately 2.25 Singapore dollars (S$) = 1 US dollar.

The extension education programme. In order that the Junior Trainees not be exploited in terms of working hours, and also to provide them with continuing education, they are required under the scheme to attend an Extension Education Programme (EEP) one day a week, such time to be calculated as forming part of their weekly working hours. Under the EEP the Junior Trainee obtains the following exposure:

	Hours per week
Language	2½
Arithmetic	1½
Civics and social education	1
Spoken second language	1
Total	6

The Extension Education Programme is conducted at four EEP Centres. Operating on the principles of the Centralized Workshops, the EEP Centres draw Junior Trainees from the work places in the nearest vicinity of the Centre.

While the intention of the EEP classes is excellent in providing a form of continuing education and a strengthening of spoken language and

numeracy, one criticism of the programme is that the subjects taught are 'bookish'. The subject contents are highly abstract and beyond the intellectual capacity of many trainees. As the courses of study lead to no recognized formal qualification but represent learning for learning's sake, the trainees and teachers tend to be disinterested. Besides this, the trainees, having entered into the world of work, might see more relevance in work-related studies or workshop practice to develop skills than in the formal academic tasks of language and numeracy learning.

It would in some respects be useful for such programmes to be replaced by workshop sessions, technical drawing, elementary mechanics, basic electricity, woodwork and metalwork. In this way the trainees would develop skills which would stand them in good stead in later years.

Vocational training

The responsibility for vocational or industrial training rests with the Vocational and Industrial Training Board (VITB) which was formed in April 1979 through the merger of the former Industrial Training Board (ITB) and the Adult Education Board (AEB).

The Board has as its objectives:

1. The provision for, promotion of, and assistance to apprenticeship training of persons employed or intending to be employed in commerce or industry;
2. The definition of the nature and duration of training for any employment in commerce and industry and further education associated with the training, the persons by and to whom the training should be given, the standards to be attained as a result of this training and the methods /for evaluation/; and
3. The provision of such courses or programmes consistent with its continuing education or further education programmes.

The inclusion of commercial education and training in its scope of functions has considerably widened the responsibilities of the Board, which currently administers 16 training institutes and three centres. The Board conducts full-time and part-time courses at its various training institutes as well as a wide range of part-time courses for self-improvement.

Although in the 1950s the policy of industrialization had already been launched, little was done to develop technical education or vocational training until 1961, when the Commission of Inquiry into Vocational and Technical Education compiled its report. The Singapore Polytechnic was built and two technical schools were opened. Following the Commission of Inquiry, several secondary vocational schools were opened to provide primary-level school-leavers with a modified form of vocational education. The secondary vocational schools failed because their syllabi were inappropriate to the requirements of the private sectors and the pupils consequently saw few prospects for themselves. The Commission recommended, however, that one of the vocational schools should be upgraded to a Vocational Institute (the Singapore Vocational Institute) and three other Vocational Institutes built.

The Teachers' Training College opened a section to train technical teachers for the technical schools that were in the pipeline. The Singapore Polytechnic, which had been providing both technician courses and courses for the commercial and service sectors, phased out its non-technical courses and except for a few technician certificate courses, concentrated on technician diploma-level courses.

The number of vocational institutes grew to 12 by 1978 and, with the acquisition of centres formerly controlled by the AEB, this increased to 16 by 1979. Enrolment, which was 1,752 in 1967, rose to more than 10,000 in 1978. The VITB conducts full-time courses in 47 trade areas at three levels—'artisan', 'trade' and technician levels.

Artisan-level courses range from three to six months' institutional training followed by two years of attachment. These courses provide intensive but narrow skill training in occupations that are specific and terminal in nature. There are few or no theory courses, and the trainees are exposed to both workshop practice and attitudinal training through formal teaching and extra-curricular activities. The former Artisan Certificate awarded after completion of these courses has since been replaced by the Certificate of Competency, and the bearers of these certificates have had the benefit of both in-centre and in-plant training. Courses that are currently awarded the Certificate of Competency are those in the building construction trades and for fork-lift operators. Courses in other trade areas are planned, several arising from specific requests of industry.

The National Trade Certificate courses are offered on a full-time and part-time basis. Entry is open to secondary-school leavers. Courses are of one to three years' duration according to the entry level. School-leavers at Secondary One level are admitted to three-year courses, those at Secondary Two level to two-year courses, and those from Secondary Three or Secondary Four levels to one-year courses. The varying lengths of the courses provide the younger trainee with time to develop his skills and gain physical maturity. These courses culminate in the National Trade Certificate grade III (NTC 3). NTC 2 level courses are offered at part-time evening classes and are open to graduates of the NTC 3 who are employed in the relevant occupation. In 1977/78 more than 7,000 attended full-time

NTC 3 courses and 1,500 part-time NTC 3 and 2 courses. The Board is continually expanding the scope of the NTC courses to meet industrial needs.

A main feature of the NTC full-time courses concerns attitudinal development. Apart from imparting skills training, the Board deems it important to provide trainees with an all-round development so that they will acquire a strong sense of discipline and responsibility to their employer and to society. This is in line with what the government has attempted to instil in workers—a strong sense of duty, a willingness to work and be trained to exacting standards, an industrious attitude and strong loyalty to firm and employer. The VITB has developed this concept into its training courses. Industrial safety is emphasized and the trainees are exposed to frequent safety campaigns at both institutional and national levels.

VITB courses will be modified and upgraded to NTC 2 level in the coming decade. This means that full-time courses will be extended to NTC 2 level which will be the basic qualifying level of institutional training. It is not intended, however, to award graduates of these full-time courses the NTC 2 certificate until they have satisfactorily completed a two-year in-plant attachment. NTC or institutional graduates will thus be full-skilled workers at the time of qualification. Courses will be extended from the present one year full-time (for upper secondary level trainees) to two years. Apart from developing a more viable tradesman, the new training schemes will reduce wastage which now exists when trainees do not enter into occupations for which they have been trained.

The concept of the Industrial Technician Certificate course is to produce an intermediate grade of craftsman-supervisor between the skilled craftsman and the technician engineer. Courses are heavily craft-biased with emphasis on technology, especially production management and supervisory skills and disciplines. The VITB, therefore, provides comprehensive and wide-ranging training schemes for the different levels of industrial workers, from the skilled artisan and skilled craftsman to the shop-floor supervisor, while the Polytechnic and the universities provide the higher grades of management and engineers.

Industry-based training. A major responsibility of the VITB is its commitment to industry to train entrants into and those already in industrial occupations. The realization of this commitment is seen in the apprenticeship training schemes operated by the Board and the numerous *ad hoc* courses apart from regular part-time and day-release training conducted at the specific requests of firms. The Board has always recognized the value of industry-based training, without which no trainee can be considered as skilled.

Apprenticeship training came within the responsibility of the Ministry of Education in 1969 when the Technical Education Department (TED) was established to take charge of technical education and vocational training. Two hundred eighty-three apprentices registered with the Ministry of Labour were 'transferred' to the TED in that year. Since then close to 10,000 apprentices have been registered, and there are currently 4,136 apprentices serving apprenticeship. Apprenticeship training normally covers a three-year period with a further two years' bonded service with the firm. During the first year the apprentice may attend full-time institutional training, or may receive training in the plant or through a combination of in-plant and part-time in-centre training. The NTC 3 is normally acquired at the end of the first year of apprenticeship. Institutional graduates with the NTC 3 will do a shorter apprenticeship of two years. The first year is followed by a two-year in-plant attachment culminating at the NTC 2 for some apprenticeships.

With the intensification of the Economic Development Board (EDB) attempts to draw foreign investments into Singapore in the late 1960s, three Joint Government Training Centres were set up between 1972 and

1975. A fourth centre under Singapore-Japanese sponsorship was completed in late 1979. These Joint Training Centres cater specifically to the metal precision engineering trades and the camera industry.

Certain industries run their own training schools. These are mainly the major shipbuilding yards, the national airline and larger firms in the road and sea transport services. Their training schemes are recognized by the VITB and through their efforts the pressure on the Board's facilities and staff is reduced. It is expected that with government encouragement in terms of monetary grants under the Skills Development Fund and the EDB Training Grants, more firms will in future undertake their own training and support their own training schools, the VITB functioning in an advisory capacity and as a testing and certification authority.

The Singapore Armed Forces run the SAF Boys School which provides technical trade training for school-leavers of between 14 and 16 years of age. The courses are residential. The boys attend school for two years after which they serve as technical tradesmen in the Armed Forces for four years. This school was conceived in 1976 to cope with the school drop-out problem and provide technical personnel for the SAF, In the same vein, the Junior Trainee Scheme for 14-16 year olds dropping out at primary school level was conceived in 1976 and implemented the following year. The JTS has been able to absorb some of the educational wastage at primary level by placing these young persons into training schemes and thereafter into suitable industrial occupations or directly into such occupations as are approved.

In order that a greater number of released national servicemen will be encouraged to enter into apprenticeship training, a training subsidy of S$60 per month is paid to reservists in two-year apprenticeship schemes and S$40 for those in three-year schemes. This subsidy is administered by the VITB and paid as soon as the reservist is registered as an apprentice. To date more than 6,000 reservists in apprenticeship schemes have been awarded this subsidy, amounting to a total of more than S$2.6 million.

To further hasten the entry of fit young men into industry through the apprenticeship schemes, the VITB and the Ministry of Defence are working out an arrangement whereby a national serviceman may, at the same time that he is discharging his military commitments, undergo skilled training as part of his vocation in the services. On completion of his national service, he will be able to enter into apprenticeship on a reduced-time basis, thus further accelerating his entry into the industrial workforce. The Board is also alive to the needs of industry to upgrade existing workers. These are achieved through *ad hoc* courses which are especially tailored to meet the needs of the firms requesting them.

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The Board has established a close link with the industrial sector in order to monitor its courses and obtain feedback on the quality and content of training. The Research Unit of the Board conducts regular surveys which can be categorized as follows:

1. Industrial profile studies on the occupational structure, manpower and training needs of industries. The objectives of these surveys and studies are to draw up profiles of selected industries, their major activities, manpower and training requirements and growth prospects.
2. Periodic surveys on employment experience of graduates. These help to establish the career history of trainees in industry, to determine whether they are employed in relevant occupations, their median wages, their employment rate and other factors relating to their working experiences.
3. Surveys on relevance of training programmes aimed at assessing the qualitative aspects of training.

Training of trainers

The Board presently recruits two categories of trainers—training officers and workshop instructors. Training officers should normally possess a GCE 'O' or 'A' level and a Technician Diploma or Certificate or equivalent, while workshop instructors should have completed secondary education and possess a National Trade Certificate together with relevant industrial experience. Both training officers and workshop instructors are engaged in the teaching of practical skills, while the theoretical subjects are mainly taught by training officers. In addition, all training staff are involved in non-teaching functions such as maintenance and repair of tools, equipment and machinery, preparation of instruction materials and audio-visual aids, and other planning and organizational activities.

In order to enable training staff to be effective as trainers, pedagogical training is provided at the Institute of Education on a day-release basis. Such training equips them with essential teaching techniques, as they cover such topics as principles of learning, teaching methods, test and measurement, audio-visual aids, and so on. To keep pace with rapid changes and specific requirements of industries, the Board has adopted a five-year Rolling Plan which ensures that training staff in the different trade disciplines are regularly sent for in-plant or overseas training.

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THE SOCIALIST REPUBLIC OF VIET NAM

by Cao Hong Phong

After the foundation of the Democratic Republic of Viet Nam in 1945, technical and vocational education grew under conditions of war. Since 1954, the technical and vocational branch in the country has developed strongly and effectively, and following the war, has recorded great achievements in serving national defence and economic construction. Since the school-year 1974–1975 there have been great changes in the Socialist Republic of Viet Nam in the development of national education in general, and in the branch of technical and vocational education in particular.

In April 1975, a new period in the development of national education began, including technical and vocational education with its history of development for 30 years. It has created a steady base for vigorous development in the training of new workers in order to serve the cause of construction and economic development in the country. As a result of war, the branch of technical and vocational education in the Socialist Republic of Viet Nam has met great difficulties, such as a lack of schools and classes of any standard, and a lack of laboratories, practical rooms and workshops with good equipment, all of which has a bad effect on the quality of education. The weak technical and vocational education in the south of the country has also demanded reconstruction, and more new establishments must be added. In the meantime, war has again occurred in the south-west and on the northern borders of the country, creating many difficulties for training work.

Among these numerous difficulties, technical and vocational education has had much attention paid to it. There is a strong belief and determination in the process of education, and technical and vocational education has followed the principle: "Study must be combined with practice, education must go hand in hand with productive activities, schools must be bound to society."

National education system

The network of infant education, including infant schools and kindergartens, has the task of bringing up and teaching the children aged from 1 to 5 years old. From the age of 6, children are admitted to the infant classes before going to the first form of the first-level general education schools.

The network of general education has the task of teaching all pupils from the first to the fourth form (first-level general education), from the fifth to the seventh form (second-level general education), and from the eighth to the tenth form (third-level general education). These classes follow the same curriculum. Besides this general education network, there are specialized schools (music, dance, and arts) where pupils who join general education can develop their natural gifts at the same time. The network of complementary education schools is also reserved for the working people. The structure of education is diagrammed below.

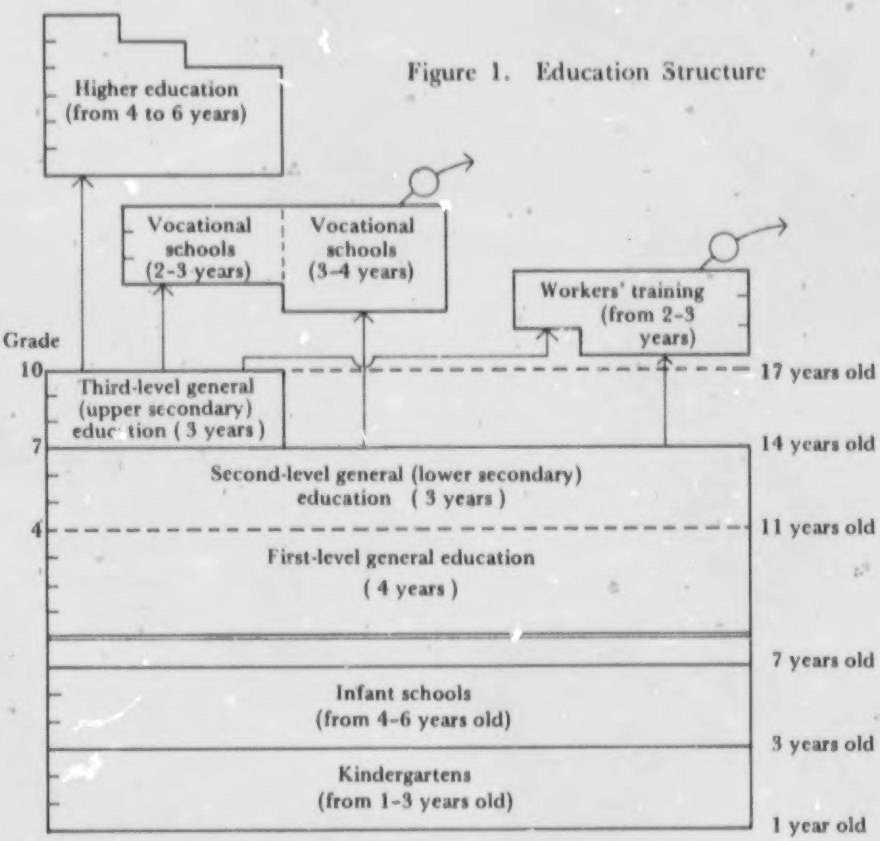

Figure 1. Education Structure

Higher education
(from 4 to 6 years)
Vocational schools (2-3 years)
Vocational schools (3-4 years)
Workers' training (from 2-3 years)
Grade
10
7
4
Third-level general (upper secondary) education (3 years)
Second-level general (lower secondary) education (3 years)
First-level general education (4 years)
Infant schools (from 4-6 years old)
Kindergartens (from 1-3 years old)
17 years old
14 years old
11 years old
7 years old
3 years old
1 year old

The specialized schools include all regular and semi-regular schools which are attached to ministries, local administrations (towns or cities) or factories or workshops, and also work-and-study classes belonging to other productive establishments that have the task of training all workers, skilled workers, technicians or economists at primary level.

The selection of pupils for specialized schools and classes is divided into two systems. Pupils chosen from third-level general education are reserved for training as high-level workers. The course lasts from six months to three years according to the profession and the level of the workers. The network of vocational schools includes all schools in the centre belonging to the ministries and general departments, and schools at the localities belonging to the People's Committees of all provinces and cities. According to the form of on-the-job training, correspondence classes have the duty of turning out technical, economic, cultural, health, educational and art cadres who have graduated from the second level of general education and worked in the national economic branches or on a cultural and social basis at factories or productive units.

The vocational schools are also divided into two systems. For students from the second level of general education (general education and complementary schools), the course is from three to four years, and for students from the third level from two to three years.

The network of colleges and higher schools includes all those with forms of in-training courses, correspondence courses and crash courses which have the duty of turning out scientists, technicians, economists, cultural cadres, health services and educational cadres with a knowledge of higher-level or equivalent education and who have worked in the national economic branches or in cultural and social branches. The selection of pupils for colleges and higher schools is from the tenth form of general education or from those workers, technicians or other professionals who have an equivalent level of education.

The college courses are from three-and-a-half to four years, and for all higher schools from four to six years.

Management of technical and vocational education

Technical and vocational education, including specialized education, is under the leadership of the government, but the ministries, branches or local authorities concerned (the People's Committees in the towns or provinces) lead and manage these schools directly.

All specialized and vocational schools belong to the ministries, general departments of the government or the People's Committees of towns or provinces. The common leadership of the target of training, the curriculum, the organization, and common statutes or regulations in the work

of training are in the charge of the Ministry of Higher and Vocational Education. That of the specialized schools is in the charge of the specialized general departments.

The training plan is determined by the development of the economic plan of the state (usually the Five-Year Plan). The labour forces are calculated from the requirements of labour for construction and the development of the national economy and the national defence, and from these requirements are calculated the norms of training. The selection and distribution of pupils who graduate from the schools are based on the realization of the state plan, thus assuring the graduates of finding work.

In the realization of the economic plan there are some points that cannot be achieved; this in turn affects the plan of training. The investment capital for the training plan is limited, and its establishment in conjunction with the economic plan has met many difficulties.

The development of technical and vocational education

Over the past 30 years, the branch of technical and vocational education has turned out nearly 100,000 cadres who have had secondary-level training in 200 different branches, and more than 800,000 workers, technicians and skilled workers in nearly 300 professional branches. The network includes approximately 280 professional secondary schools and 350 vocational schools, creating a firm basis for further development.

In the process of its development, technical and vocational education has gained much experience in educational management. At present, the branch of technical and vocational education in the Socialist Republic of Viet Nam has constantly tried to develop with a view to meeting the requirement for trained people to rebuild the country after years of war.

In spite of its achievements, technical and vocational education has registered some errors on the side of educational quality. Both this education and the national system of education in the country have therefore been called upon to research and resolve every aspect of the question through educational reform, which is now being done.

Teacher training. The formation of teachers for technical and vocational education includes all teachers in secondary technical and vocational schools. In general, technical and vocational secondary school teachers are chosen from graduates of the Faculty of Education of the university to teach social sciences and fundamental science, from technical higher or economic schools for teaching basic and professional subjects or from workers in social, productive establishments (factories, offices, or workshops) who have graduated from higher schools. A course in pedagogy (educational science) is provided for those who have not attended the Faculty of Education before teaching at secondary technical and vocational schools or alternatively in-service training can be followed.

Table 1. Technical secondary education

School years	Total number of schools	In the North	In the South	Total number of pupils
1974 - 1975	196	196	.	69 800
1975 - 1976	186	186	.	83 500
1976 - 1977	265	182	83	101 500
1977 - 1978	263	166	97	107 800
1978 - 1979	263	166	97	117 400

Table 2. Vocational education

School years	Total number of schools	Total number of pupils
1973 - 1974	101	36 400
1974 - 1975	183	78 000
1978 - 1979	366	140 000

The practical tutors in vocational secondary schools are those who have graduated from these schools or are experienced workers chosen from vocational schools or from productive workshops and given the necessary knowledge of pedagogy for teaching theory and practice. Technical school teachers are chosen from the technical schools of the country or have graduated from institutions abroad. They are also chosen from productive establishments, including engineers, technicians, workers or professional employees who have experience and have attained a high level in their profession. They are then instructed in pedagogy for the teaching of vocational subjects and theory.

All teachers in vocational schools (or classes which turn out workers of vocational employees) include theoretical and practical teachers. On the one hand, they are graduates of the vocational teachers' schools (for example, the Technical Pedagogical schools) and on the other, are chosen from third-level graduates in the vocational schools or higher-level workers at factories or productive establishments who are given complementary vocational pedagogy.

Starting from the viewpoint that the teacher is one of the most important factors deciding the quality of training, the state is constantly trying to raise the professional standard, teaching ability and physical strength of teachers. These requirements are carried out through the work of teacher training. The content of training courses includes philosophy, politics, educational and teaching theories, technical and practical experiences in production and all new problems of technical and educational sciences. Teachers are also given in-service training in many forms, such as short-time classes by the Ministry of Higher and Vocational Education or other ministries concerned; classes at vocational schools for teachers and tutors on pedagogy or professional knowledge; the organization of practical work for teachers at factories, workshops or productive institutions with a view to 'learning by doing', or sending them abroad to learn. In vocational education, classes for the exchange of experiences on teaching are organized.

Equipment. Technical equipment for laboratories, workshops and school farms (camps for production attached to schools belonging to the agricultural branch) is necessary for carrying out the process of technical and vocational education. It is the key way to acquire a complete education, especially in the creation of a base for the process of combining education with productive work. Because of the influence of the war on the development of production, technical equipment in workshops and school farms is still poor. The basic technical laboratories lack modern equipment necessary for conducting scientific experiments. Practical workshops can only train at a vocational level and do not always combine training with the production of materials. The school farm serves agricultural school pupils. Although the school farm is doing real production work, it is not, generally speaking, a model of modern agricultural production in technique and management. A great number of semi-regular vocational schools lack practical workshops, and such difficulties have restricted the quality of education.

In the last five years, the greatest problem in the process of the development of technical and vocational education in the Socialist Republic of Viet Nam has been the requirement to turn out a large, new work-force to serve the cause of economic construction. A great number of technical and vocational schools are also short of teaching materials. Besides these difficulties, there is a shortage of teachers. Those with professional, technical and vocational knowledge are in great demand and their professional level is still very low.

Curriculum

In the Socialist Republic of Viet Nam today, there are more than 200 branches training middle-level cadres, and more than 300 vocations that turn out workers and other personnel. In general, the target of training for vocational secondary schools and workers is on a large scale.

After determining the target of education for each branch, the establishment of a study plan and the choice of curriculum content are the basic problems in order to achieve this target. In the study plan for each profession, the target includes all subjects as well as the teaching of political ideas and health, and the work plan for all subjects, practical work, productive activities and examination is also defined.

Students of secondary schools are generally offered from 16 to 20 subjects, including all common subjects (for every branch of education) such as mathematics, physics, chemistry, linguistics, politics, and sports (gymnastics and military training) as well as basic and vocational subjects. The common subjects make up 30 per cent of the periods of all subjects, the basic subjects make up about 38-40 per cent and the vocational subjects 30-32 per cent.

For workers, the studying and teaching plan is from six months to three years. All theoretical subjects take 25-30 per cent of the total time, while the practical and productive activities take 70-75 per cent.

Special attention is paid to the relation between theory and practice during establishment of the study plan and curriculum. Practice plays an important role in the formation of professional ability in secondary school students, workers or vocational personnel and helps to form the personalities of new workers. It also helps to consolidate ability, digging deep

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into knowledge that has been learned, and forms operational ability and the opportunity to use theoretical knowledge in the reality of work and production.

On the other hand, theory in the curriculum is also a necessary part of scientific, technical, and vocational knowledge which is chosen in accordance with the target of education. It is the basis for the formation of personalities and abilities. In reality, however, the reasonable solution of the relationship between theory and practice and the time of the school term is not a simple problem. In technical and vocational education, much attention has been paid to the practical question, its content and time. In secondary vocational schools, practice in the theoretical subjects includes the use of exercises, experiments and practical subjects that take from 12-18 per cent of the period of the school term. Productive activities include the practical training of workers, technicians or professional personnel; productive work that produces material prosperity and public service for society take from 40-45 per cent of the period of the school term. The tendency to put productive activities into the curriculum is developing, especially in the field of technical and vocational education. Productive activities in the process of education have thus a close connection with the curriculum. In the vocational schools professional practical exercises and productive activities take from 70 to 75 per cent of the time in the whole school term.

In the process of study at school, pupils understand the educational content through teachers' instructions and through the direct struggle with productive, social environment, and at the same time use their acquired knowledge to resolve the problems of reality.

In the Socialist Republic of Viet Nam many professional secondary schools have combined education with productive activities in order to achieve political and ideological education; love of vocation, love of men and love of social morality, as well as the cultivation of vocational ability including the training of workers and technicians. Putting productive activities into the process of education not only serves the main target—the education of men for all-sided development—but also brings valuable results in technical improvement in production to the benefit of society.

The combination of education with productive activities is carried out in various ways:

1. On-the-job training in school is combined with production;
2. On-the-job training is combined with productive labour inside the school or with a productive contract outside the school (factories, construction-sites); or

3. On-the-job training is combined with productive labour in the productive establishments of the school.

In the field of vocational education, productive activities are carried out according to the level and conditions of schools, factories, and productive establishments.

Problems and constraints

The greatest problem at present is the lack of technical equipment for schools. The quantity required for turning out technicians and skilled workers is extremely large, for after 30 years of war, reconstruction of the economy and culture should take place as quickly as possible. But with the damages of war, the necessary capital investment has not been made in the undeveloped economy so that funds might be channelled into technical and vocational education, which is part of the road to rapid development. Although some schools are moderately well-equipped, a great number lack equipment of any sort, or have workshops which are too small to cope with the increased number of pupils. This situation has limited the quality of the practical programme, and also affects the quality of the combination of teaching and learning through productive activities.

Another difficulty is the shortage of teachers. In three years (1976–1979), the number of professional secondary schools in the south has increased from 20 to more than 100 schools. As a result a great number of teachers have been transferred from the north to staff southern schools and at the same time have had to be replaced. At present, the number of teachers is less than the requirement although the quality of teachers is as good as before. Although the curriculum is established and has been unchanged for many years, when carried out it does not meet the requirements.

On the other hand, since 1975 and the foundation of the Socialist Republic of Viet Nam, the situation of the country has changed to one of economic, cultural construction in peaceful conditions. This means that the branch of technical and vocational education should change, not only in quantity but also in the content of the curriculum so that it is suitable to the new conditions. This has not yet been done and is clearly a weak point which must be overcome. Educational reform in this area is now underway. Thus, in spite of the great difficulties imposed by the long years of fighting and bombardment, the country is determined to develop education, knowing full well that it cannot be done in a short time.

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SRI LANKA

by J.H. Dayaratna

Introduction

Formal technical and vocational education in Sri Lanka is provided by a number of organizations which may be governmental, semi-governmental or private sector agencies. Some of the important ones are the following:

1. The Ministry of Higher Education;
2. The National Apprenticeship Board;
3. The Ministry of Labour;
4. The Ceylon Transport Board;
5. Industrial Development Board;
6. The Ceylon Electricity Board;
7. The Departments of Irrigation, Survey and Railways; and
8. Semi-governmental corporations and private enterprises.

Ministry of Higher Education. Until 1977 technical and vocational education was carried out by the Ministry of Education but, with the coming into power of the present Government in 1977, a separate Ministry, namely the Ministry of Higher Education, was set up with technical and university education coming under its purview. Technical and vocational education provided by the Ministry of Higher Education is carried out through a network of Junior Technical and Polytechnical Institutes, of which eight Junior Technical Institutes and seven Polytechnic Institutes were in existence in 1977. Since then four more institutes have been set up and 14 more are to be established within the next three years.

The National Apprenticeship Board (NAB). Established by an Act of Parliament in 1971, the NAB functions under the Ministry of Youth and Employment. As the name implies, the NAB provides on-the-job apprentice training at engineering and technician level (post-secondary) and also at craft level (senior and junior secondary). Post-secondary training provided by the NAB is of one year's duration, while its senior and junior secondary-level training covering nearly 116 trades is from one to four years depending on the trade. The engineering- and technician-level apprentices of the NAB receive two to three years' institutional education at a university. The craft-level apprentices receive only six months of basic or advanced training at a technical institute belonging to the Ministry of Higher Education.

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The Ministry of Labour has three Vocational Training Institutes which also provide technical and vocational education at junior secondary level. The duration of training may be one or two years.

The Ceylon Transport Board (CTB). Under an agreement between the Government of Sri Lanka and the Federal Republic of Germany, aid was granted for the establishment of a training school to provide vocational training for the engineering craftsmen needed by the Ceylon Transport Board. Generally referred to as the Ceylon-German Training School, this was set up in 1959. In view of its outstanding success, and to meet the increasing demands of the CTB, a second school named the Ceylon-German Technical Institute was established in 1974. The vocational courses conducted by both these institutes are engineering craft courses for automobile mechanics, machinists, welders, tinkers, and electricians to meet the manpower needs of the CTB. Special courses are also provided for training 'unskilled' personnel to semi-skilled level (one year) or to skilled level (two years). Short-term upgrading courses are also provided at these institutes for all grades of engineering employees of the CTB.

Industrial Development Board (IDB). Conceived primarily to assist the small sector industries, the IDB also provides training at engineering craft level at its own training institute. The duration of training varies from six months to one year depending on the needs of these industries.

The Ceylon Electricity Board (CEB). This is another agency which provides institutional basic training as well as advanced training to personnel selected for employment in the CEB.

The Departments of Irrigation, Survey and Railway also have institutes of their own to train their apprentices. The Irrigation Department provides a four-year course at its institute for irrigation technicians, and the Survey Department conducts a two-year course for surveyors and levellers. The Railways Department provides training for special apprentices (three years) and technicians (four years).

Apart from these major agencies there are a number of private-sector organizations which have institutional facilities to provide on-the-job training for their own personnel.

The organization of technical and vocational education

The technical institutes under the Ministry of Higher Education provide a wide variety of full-time and part-time courses in the fields of engineering or commerce with the aim of helping school-leavers to acquire useful knowledge and skills for gainful employment, or of helping those who are in employment by providing redevelopment training.

The satisfactory completion of these courses and the examinations associated with them lead to the award of a National Diploma or a National Certificate in the relevant field of study. These courses can be broadly classified by their content and scope as follows:

1. **Professional and Higher National Diploma courses.** These post-secondary courses, conducted only at one polytechnic institute, prepare students for the professional examinations of the Chartered Institute of Secretaries, London, and the Institute of Cost and Management Accountants, London. Like the professional courses, the post-secondary Higher National Diploma courses are also confined to the field of commerce. These courses are of a standard comparable to that of a first degree at a university and are available at a number of Institutes in accountancy (four years part-time), commerce (four years full-time), and valuation (two years full-time and two years part-time).

2. **National Diploma course.** These senior secondary courses are available in the fields of technology, commerce, and some others. The National Diploma in Technology (NDT) courses are the only full-time courses in the country for the education and training of engineering technicians. The NDT courses are at the moment conducted at only one polytechnic institute and the University of Sri Lanka, Moratuwa (formerly, Institute of Practical Technology). These NDT courses are of three years' duration (two years full-time and one year in-plant training) and cover the following fields of technology:

Civil engineering
Mechanical engineering (general)
Mechanical engineering (automotive)
Electrical power engineering
Electronics and telecommunication
Chemical engineering
Marine engineering
Textile technology
Rubber technology

The National Diploma in Business Studies courses (two years full-time) are conducted in the fields of auditing, cost accountancy, marketing and industrial relations. The National Diploma in agriculture, home science, English, foreign languages, tourism and co-operative management are the other courses provided under this category.

3. **The National Certificate courses.** These form the third category of courses provided by the technical institutes at senior secondary level. First under this category are the three-year part-time courses leading to the

National Certificate in Technology in civil engineering, mechanical engineering, electrical and electronic engineering or quantity surveying. Being essentially improvement courses, these are aimed at developing the theoretical knowledge of persons who are already employed in relevant fields of engineering. These courses illustrate the degree of articulation possible between the technical and vocational programmes offered by the technical institutes and the stages of general education as well as the world of work.

The second type of course under this category is represented by courses of the National Certificate in Business Studies, which are conducted either as full-time or part-time courses, usually two years. These lead to the National Certificate in Business Studies in accountancy, marketing, stenography, transport and shipping or administrative practice. The one-year full-time course leading to the draughtsman's Apprentice Certificate also comes under this category.

4. **The National Craft (Trade) Certificate courses.** These junior-secondary-level courses are conducted at all the technical institutes functioning under the Ministry of Higher Education. These are two-year full-time courses available in the fields of machine-shop practice, fitting practice, automotive mechanics, electrical installation, electrical mechanics, woodwork, building trades, radio and electronics, and printing. These are designed to meet the country's needs in semi-skilled craftsmen. Apart from the courses mentioned above, the technical institutes also conduct a number of part-time craft-level courses which are generally of one year's duration. These are designed to help those employed in the relevant fields to improve their theoretical knowledge or practical skills, or to better their prospects.

5. **Short-term courses.** Covering a wide range of activities, these are mainly intended for self-employment. The duration of these courses is generally six months to one year. Basic theoretical knowledge and practical skills are provided in the respective fields and at the same time they provide an opportunity for experimentation and the application of new technology so as to enhance quality or increase production.

Teaching staff

The scheme of recruitment and the minimum qualifications of lecturers and instructors required for the technical institutes functioning under the Ministry of Higher Education differ widely depending on the level at which they are expected to teach. For Lecturers grade I, covering 14 fields of study, the minimum qualifications specified are (1) a first- or second-class Honours Degree and a post-graduate degree or diploma or (2) a professional qualification and five years of teaching or practical experience.

For Lecturers grade II, the minimum qualification is a degree or equivalent qualification with at least five years of teaching experience. For the grade of Senior Instructor, which is generally a promotional grade for instructors, the minimum academic qualification stipulated in the field of commerce is a degree. Hence it is possible for a Senior Instructor in commerce to move up to the grade of lecturer after the requisite period of service. In the case of Senior Instructors in the engineering trades, however, the minimum educational qualification is a technician-level certificate and not less than five years of teaching experience in the relevant trade. The instructors in the field of commerce are again expected to have a degree as minimum qualification for recruitment, while instructors of the engineering trades are expected to have the National Diploma in Technology in the relevant field or equivalent qualification and a minimum of five years' practical experience.

The instructors recruited for the engineering trades are given one year's pedagogical training at the Instructor Training Unit of the University of Moratuwa, but instructors and lecturers selected especially for the field of commerce receive no special training. Most of the instructors selected for the engineering trades also receive further training abroad, especially in Japan, these training programmes being sponsored by the Japan International Co-operation Agency. There are no facilities available locally for in-service training of lecturers or instructors for continuous upgrading of their professional competence.

Facilities

The existing technical institutes have separate workshops for carpentry, automotive mechanics, machining, fitting, electrical trades and building trades, the total workshop floor area being approximately 14,000 sq. ft. Workshops of this type are essentially for craft training. Lecture rooms, a drawing-room, library, office room, staff room and students' recreation room are other general facilities available. The total floor area of a technical institute is about 25,000 sq. ft.

The equipment and machinery available at these institutes constitute the minimum required for conducting the craft-level courses but the situation is not altogether satisfactory. Most of the machines are over 15 years old and are either out of date or malfunctioning. Limited financial provisions restrict the replacement of outdated machinery with new equipment or the provision of new and up-to-date facilities to meet the changing demands.

Finance

Financial provisions for capital and recurrent expenditure for technical institutes under the Ministry of Higher Education as well as other Departments are made in the annual budgetary estimates. The total expenditure incurred by the existing technical institutes in 1978 was about Rs. 7 million.* The budgetary provisions for the year 1979 for the technical institutes are given below.

Recurrent expenditure	Rs. 12 822 000.00
Capital expenditure (buildings)	Rs. 1 500 000.00
Equipment and furniture	Rs. 1 500 000.00

Continuing education

Except for a few private-sector enterprises and semi-government corporations which provide in-service training for their own personnel, there is no well-organized system of providing facilities for continuing education at places of work as such. Most of the part-time programmes offered in technical institutes, however, have been designed with this in view. For instance, a person who follows a two-year full-time craft course at a technical institute can, if he or she has the requisite academic qualifications and the stipulated period of practical experience, follow one of the courses for the three-year part-time National Certificate in Technology and qualify for a higher grade in the profession. Similar avenues are open in the field of commerce.

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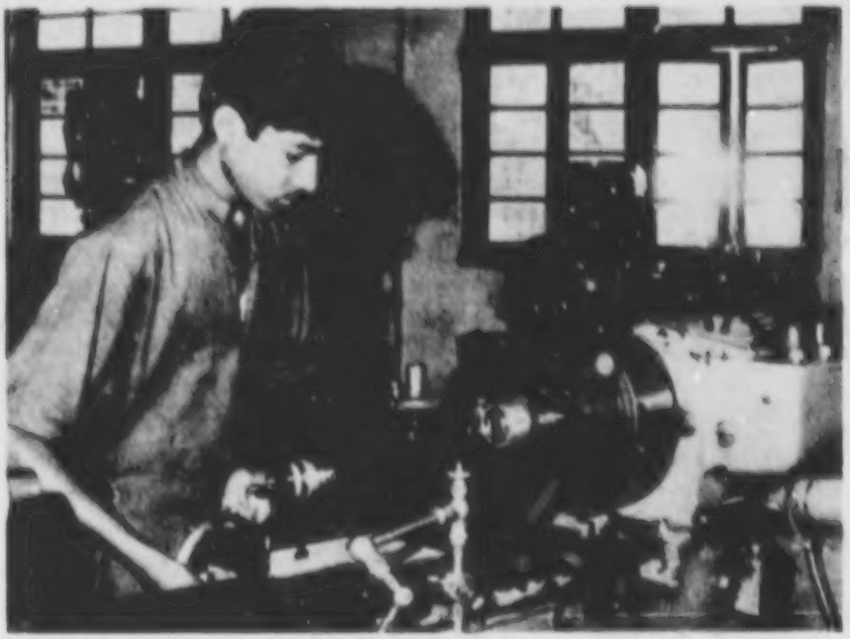
* Approximately 15.60 rupees (Rs.) = one US dollar.



Problems and constraints

Problems encountered in the development and improvement of technical and vocational education in Sri Lanka are as follows:

1. Lack of a central authority which could take policy decisions, decide on the scope and content of curricula, and pool resources, and also bring about a uniform system of technical and vocational education at all levels and co-ordinate programmes carried out by the public as well as the private sector;
2. Lack of adequate facilities to train the personnel required for technical and vocational education or to augment their training;
3. Inadequate financial resources to re-equip and improve the existing facilities and to establish new institutes to cater to the ever-increasing demand for trained personnel; and
4. Absence of a guidance system which could not only assist those who leave the general educational stream in pursuit of technical and vocational education but also help those in employment who desire to further their studies.

Curricula for technical and vocational education

Objectives. The objectives which define the curricula are broadly as follows:

1. To provide opportunities for the acquisition of practical skills, theoretical knowledge and healthy attitudes with a view to finding gainful employment, especially for those who do not intend to pursue higher studies;
2. To bring about a clear understanding of technological and scientific principles and the contributions they could make towards betterment of life, and also to create an awareness of their social, political and environmental implications;
3. To promote an attitude of mind which would enhance appreciation of work and respect for labour;
4. To provide a continuous system of education for persons who are already engaged in a vocation but wish to better their position by the acquisition of new knowledge or skills; and
5. To meet the ever-increasing demand for manpower in all sectors of public life.

Course structure. The occupational areas covered by the technical and vocational programmes conducted in the technical institutes of the Ministry of Higher Education have been outlined above. The subjects covered by the curricula have been identified by taking into consideration the skills, knowledge or other information expected of an individual destined to fill a particular niche in the work force. Curricula are designed by a panel of experienced lecturers and instructors who act in close liaison with prospective employers. The universities are also represented at these discussions and the subjects, their content and level of treatment are decided upon with the consent of all parties at these deliberations.

The relative emphasis on theory or practice varies depending on the course. To illustrate this, the subjects for the two-year full-time National Craft Certificate courses with their time allocations are indicated below.

Subject	Number of hours/week
Trade theory	3
Trade practice	20
Trade calculations	1
General science	2
Geometrical and mechanical drawing	4
Sinhala (first language)	1
English language	2
Liberal studies	1
Library	1

For part-time craft courses, which are for those employed in the relevant fields, two hours of theory and two hours of practice are provided. For the National Certificate and National Diploma courses the time allocation again varies depending on the subjects and their content.

Since the technical and vocational educational programmes offered at the technical institutes are institutional, linking the curricula to productive work is not emphasized. For those who follow the National Diploma in Technology courses, workshop practice is, however, provided during the third year of training. Apprentices of the National Apprenticeship Board are involved in productive work to a large extent because they receive on-the-job training throughout, except for the six months of basic training provided at a technical institute.

Evaluation. The various agencies mentioned earlier involved in technical training have their own systems of evaluating outcomes of the curricula. For the technical and vocational courses provided by the technical institutes, the final evaluation is by way of an examination conducted by the Commissioner of Examinations. Although much desired, there is no organized system of continuous evaluation practised at the moment. Divergencies of a serious nature do not occur between the curricula and their actual implementation, for the curricula are designed taking into consideration the existing facilities, and available staff. It should, however, be mentioned that problems and constraints mentioned earlier impede the designing of much more appropriate curricula in keeping with the advances made in this field in developed countries.

Innovations and experiments

Provision of a better standard of living for everybody and the need to generate employment opportunities are problems affecting every developing country, and Sri Lanka is no exception. Sri Lanka is essentially an agricultural country with its economy being dependent on tea, rubber and coconut. Dependence on such commodities exposed to fluctuating world prices and fierce competition from others results in a severe drain on the country's resources with a fair proportion spent on foodstuffs alone. Ways and means of overcoming this situation and making the country self-sufficient in foodstuffs has engaged the attention of every government since Independence. The present government has undertaken to accelerate development in this sector. Being cognizant that a viable economy rests not only on the development of agriculture but industry as well, it has embarked on a programme of industrial development on an unprecedented scale. The Greater Colombo Economic Commission (GCEC), which is entrusted with this task has already opened up about 125 acres in its Investment Promotion Zone (IPZ) for establishment of industries under Phase I of the programme and about 200 more acres are to be opened up under Phase II. The GCEC has so far approved 77 industries for location in the IPZ, of which ten are already in production and 24 are in various stages of construction. About 6,000 people were employed in the IPZ in 1979; this figure is probably at least 17,000 by now.

Manpower development. The fact that these development projects need semi-skilled and skilled personnel of all grades in sufficient numbers is a problem affecting the country at present. The problem was aggravated by a mass exodus of technically-qualified personnel to the oil-rich Middle East. This situation became so acute, especially in certain fields, that the GCEC is planning to set up a training institute of its own to train at least a portion of the skilled labour it requires. The Ministry of Higher Education has also decided to set up 14 new technical institutes to prepare capable manpower needed for present as well as future development programmes of the country. Another innovative feature is the decision to set up a number of affiliated technical units. Functioning under the control of an existing technical institute these units would aim primarily at meeting the manpower demands of a particular locality.

Curriculum development. Another significant feature is the decision to set up a curriculum unit under the Ministry of Higher Education to restructure the existing curricula as well as to design new ones in keeping with changing demands. The curricula of engineering trades are especially likely to undergo changes. The National Craft Certificate courses are to be restructured so that trainees receive one or two years of institutional training (depending on the trade) followed by two years of apprenticeship training; the Craft Certificate being awarded in two parts (i.e. after institutional training and after apprenticeship training). Even the syllabi of such general subjects as English language are to be revised so that they are more 'job-specific'. As we saw earlier, the evaluation of the technical and vocational programmes conducted in the technical institutes is at the moment confined to a final examination conducted by the Commissioner of Examinations. But this system has many drawbacks, for the outcomes of the curricula cannot be satisfactorily assessed by an 'examination' lasting only one or two hours. This is especially so in the field of engineering trades where much time is spent on practical work. Hence it is envisaged that a system of continuous evaluation be introduced which would provide a clearer picture of a trainee's performance.

Short-term courses and other school programmes. The introduction of short-term courses could also be considered a new feature. Generally of six months' to one year's duration, they are meant primarily for those in self-employment. These courses differ from one institute to another depending on the local needs and availability of raw materials. While providing the requisite knowledge and skills to help gainful self-employment in the field chosen by the students, these courses also aim to introduce new technology into the traditional crafts practised as cottage industries with a view to bringing about improvements in the quality and quantity of production.

The School Leavers' Programme of the Ministry of Education is another innovative feature of significance in the development of technical and vocational education in Sri Lanka. Students who leave school at either the junior-secondary or the senior-secondary levels and fail to enter any stream of vocational training are enlisted for this programme. Technical units are set up at schools with sufficient facilities and these programmes are carried out in such units during afternoons or weekends. By using local raw materials and talents, the students are not only exposed to the basic skills and knowledge pertaining to a particular craft but are often engaged in the production of useable or saleable products.

Conclusion

The high priority placed at the moment on technical and vocational education in national development is reflected even in the general education programme of the country. A 'technical' subject (e.g. woodwork, metal-work, ceramics, weaving) is one of the subjects of the core-curriculum at the junior-secondary level. Apart from developing manipulative skills, these subjects aim to bring about an initiation to technology and working life, an appreciation of the scientific and technological advancements of contemporary society, and respect for and an understanding of manual work and its place in the process of nation-building.

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THAILAND

by V. Pangputhipong

Structure of technical and vocational education

Technical and vocational education in Thailand aims at turning out a work force at various levels to meet the needs of each community in society. At the primary level, vocational training is geared towards creating the work habit in learners, enabling them to apply the lessons and work done at school to their daily existence.

In secondary education, technical and vocational training looks on the one hand toward providing learners with the necessary experience and skill to effectively pursue a career; on the other, it prepares them for further studies in relation to their aptitudes and interests. It may be taught in a secondary school as part of secondary education, or it may be a discipline in itself, providing various training for skilled and semi-skilled work.

In higher education, it is an advanced technical and vocational training for specialized skills and experience in accordance with the demands and development of manpower requirements. It may be taught in a specialized institute, a college or a university, as appropriate. Students are trained according to their individual capacities, aptitudes and talents.

In addition, non-formal education is a kind of part-time programme. It provides a short course for learners in order to equip them with working skills or to have extra training (or fill the gaps) in their current work, enabling them later to perform their task properly or with greater efficiency, thus clearing the way for possible advancement.

Government vocational education. Vocational education started in Thailand in 1935, when trade schools for boys and girls were provided in various provinces throughout the country. Later the number of vocational schools and colleges increased. At present the Department of Vocational Education and the Institute of Technology and Vocational Education, Ministry of Education, are chiefly responsible for technical and vocational education and training. Vocational training is, however, also operated by some governmental agencies such as the Ministry of Defence, the Ministry of Communication, the Ministry of Interior and the Royal State Railway of Thailand.

Technical and vocational education is provided in harmony with economic and social development. The Department of Vocational Education operates in five major fields:

1. Agriculture
2. Trade and industry
3. Business and commerce
4. Home economics
5. Arts and crafts

Each major field is offered in four full-time programmes:

1. Three-year programme for skilled labour level. This takes three years of study after graduation from grade X (grade IX for 1981 curriculum);
2. Two-year programme for technical level. This takes two years of study after graduation from the three-year programme;
3. One-year programme for technical teacher training. This takes one year of study after graduation from technical level; and
4. Two-year programme after secondary education certificate grade XII. This is a new programme that has just been set up. It is of two years' duration after graduation from secondary education.

The Department of Vocational Education is also responsible for short courses in vocational training. There are 12 polytechnic schools throughout the country, of which four are in Bangkok. This type of school offers courses from 9:00 a.m. to 8:00 p.m., enabling students to do their jobs and take short courses in their spare time. There was a total enrolment of 21,096 students in 1978, and there are plans to add seven more polytechnic schools in the period 1981–1986. The Department also provides short courses for agricultural training at some agricultural schools or colleges. Mobile agriculture units move directly to the local agricultural community, so that farmers can easily attend training without leaving their farms during the study period.

Vocational courses are offered to serve the needs of each individual's capacity, aptitude, and talent as well as those of society. In addition to the Department of Vocational Education, the Institute of Technology and Vocational Education offers technical and vocational courses to a higher level. Some courses are provided up to technical degree level. The Guidance Service Centre, Ministry of Education, and guidance services at schools make known the technical and vocational fields of study and job placement to students. Table 1 gives full-time enrolment figures for the years 1974–1978.

Private technical and vocational education. The Office of Private Education, Ministry of Education, administers private technical and vocational schools and colleges. There are 130 of these, providing vocational courses in the fields of machine shop, electricity, radio, agriculture, and business administration for those who graduate from grade X. Besides these, there are 743 schools in the country offering short courses in tailoring, hairdressing, typing, shorthand, accounting and handicrafts.

Table 1. Expansion of enrolment in technical and vocational education, 1974-1978

	No. of schools/ colleges	Level	1974	1975	1976	1977	1978
Trade and industry	85	skilled labour	32 471	39 235	46 160	55 932	57 060
		technician	7 516	8 220	10 345	16 438	17 824
Agriculture	44	skilled labour	5 443	6 238	7 152	9 463	12 058
		technician	2 426	2 111	2 028	2 352	3 267
Business and commerce	7	skilled labour	16 967	18 262	20 170	20 976	22 673
		technician	4 945	5 197	5 812	3 937	4 758
Home economics	30	skilled labour	14 598	16 203	17 885	17 845	17 463
		technician	1 480	1 630	2 545	4 314	5 549
Arts and crafts		skilled labour	2 445	1 931	2 038	1 711	1 716
		technician	1 125	1 236	1 676	1 028	1 182
Total	166	skilled labour	71 924	81 869	93 405	105 927	110 970
		technician	17 492	18 394	22 406	28 069	32 580
Short courses in 12 polytechnic schools			23 790	24 050	27 610	23 238	21 096

Financing

During recent years there has been a large increase in both the quality and quantity of technical and vocational education. The average unit recurrent cost is about three times the average level in secondary education. The recurrent cost per head of technical and vocational students varies in different trades, as shown in Table 2.

The public technical and vocational schools also charge tuition fees of up to 720 Baht per year for the skilled-labour level, and 740 Baht per year for the technical level. These fees supply only a very small portion of the total revenues needed for running technical and vocational schools: a large proportion of vocational and technical school expenditure is financed by the government. Fees in private technical and vocational schools are of course higher than public technical and vocational schools, and vary from 2,500-5,200 Baht per year depending on the curriculum being studied and the quality of instruction given.

Vocational training in governmental agencies. Technical and vocational training programmes are organized by some governmental agencies

Table 2. Expenditure per head of students in different trades, 1978

Trades	Skilled labour level (Baht per year)*	Technical level (Baht per year)
Agriculture	3 863	5 851
Trade and industry	5 295	6 192
Business and commerce	2 487	2 563
Home economics	3 087	3 178
Arts and crafts	3 296	

* Approximately 20.15 Baht = 1 US dollar

such as the Military Technical Training School, which offers courses in general fitting, electrical fitting, machining, boat building, electronics, and aircraft maintenance. The Post and Telegraph School provides courses in the postal service, telegraph and tele-communication work, the Railway Engineering School offers courses in mechanical and civil engineering, and the National Institute for Skill Development, Department of Labour, provides upgrading and basic skill-training courses for foremen, workers, unemployed adults and adolescents. These short courses of training are provided by governmental agencies according to their requirements.

Craftsmen do not often attend vocational schools or technical colleges. Most of them gain experience from working in industries for a long time, and others are self-taught.

In-service training of teachers

During the past few years, the Department of Vocational Education has been successful in obtaining foreign assistance, enabling it not only to improve equipment in a large number of technical and vocational schools, but also to considerably upgrade the qualifications of the instructors. Such foreign aid has been used to improve 15 trade and industrial schools, and 10 agricultural schools. It has assisted in establishing a Technical Agricultural Training Centre, and has also provided continuing assistance to two technical institutes. Loans have helped technical and vocational education both in teaching equipment and in-service training courses for improving staff from time to time. At the same time the Thai government provides large sums of money from its own budget, both as counterpart funds for the foreign aid projects, and for upgrading and improving other vocational schools and technical colleges.

Although the technical education programme in Thailand comes under the responsibility of the Department of Vocational Education, many government and other private agencies provide apprenticeship training to meet their own requirements. This results in duplication of effort, and while some fields of work are overtrained, others have no training at all. For example, apprenticeship training greatly contributes to the increase in the number of industrial workers, but concurrently results in a shortage of agricultural workers. The Department also realizes that vocational graduates are not sufficiently trained to perform their occupations; they still lack skills, knowledge and responsibility. The government should encourage industry to accept an appropriate share of responsibility for training workers.

Another problem of technical and vocational training is that existing teachers need more experience in teaching methods. Moreover, it seems that most teachers are not proud of their occupation, and this adversely affects their teaching performance. Money, time and equipment are not used to the best advantage.

At present the Department of Vocational Education realizes this, and has set up a project for the development of technical and vocational teacher training. It provides in-service training for teachers of various trades in order to catch up with progress in technology and market demand. Teacher training programmes are conducted with the co-operation of King Mongkut's Institute of Technology, the Institute of Technology and Vocational Education, and private enterprises. In addition, the Department has increased recruitment to 1,303 teachers of different trades and levels in 1979.

Curricula of technical and vocational education

The Department of Vocational Education is responsible for three levels of technical and vocational education; namely semi-skilled labour, skilled labour, and technical levels. It provides this in the form of non-formal education and formal schooling.

Level of semi-skilled labour. The objective of the curricula is to provide various short courses and part-time courses in order to develop the working skills required for entering certain occupations, or for those who want to change their jobs, at minimum time and expense. The course duration is at least 225 hours, and can be followed by students who have completed grade IV. The short-course programmes are offered in polytechnic schools and mobile units. About 36 courses are offered according to the needs and interest of people in the communities, such as masonry, radio and TV repairing, dressmaking, typing, secretarial, accounting, agriculture, mechanic fitter, leatherwork, advertising design, and electrical wiring and installation. Students are awarded a certificate on completion and are classified as semi-skilled workers.

Level of skilled labour. The curricula for this level aim to train young learners to become skilled workers, which the country badly needs. There are five major fields of curricula: agriculture, trade and industry, business and commerce, arts and crafts, and home economics. These are offered in schools and colleges under the Department of Vocational Education, the Institute of Technology and Vocational Education, and some campuses of the King Mongkut Institute of Technology.

Technical and vocational education curricula try to produce both moral and qualified manpower with discipline and responsibility. The structure of the curricula consists of the following:

1. Academic subjects such as Thai language, social studies and physical education;
2. Related subjects such as English, science and mathematics. These subjects are related to trade or industrial subjects; and
3. Trade or industrial subjects such as electricity, auto-mechanics, building construction, machine shop, business, home economics, foods and nutrition, and so on.

Trade subjects are emphasized, with more periods in both theory and practice than academic subjects. Thus only 20-25 per cent of the study period is given to academic and related subjects, and 75-80 per cent to theoretical and workshop training in technical and vocational skills. With this weightage of two-thirds practical work and one-third theoretical training, students have the skills and knowledge to serve as skilled workers in the various trades upon graduation.

The programme at skilled-labour level is a three-year course, and admits those who have completed grade X. According to the new curriculum (1981), however, the three-year programme will accept those who have completed grade IX.

Technical level. The objective of this curriculum is to provide technical training in various fields with emphasis on practical technologies. At present the curricula at technician level are being improved by stressing genuine vocational subjects to enable graduates to find jobs in which their knowledge can be applied.

Technical education at this level is offered in three programmes:

1. A two-year programme for students who have graduated from grade XIII, skilled-labour level, in any trade. Graduates are certified as technicians, and obtain a technical education diploma on completion.
2. A one-year programme for technical students who have graduated from the two-year technical level. This year is for the study of teaching methodology, and serves as pre-service training for those who want to become technical and vocational teachers. Students taking this programme must complete technical courses from the two-year programme, grade XV.
3. A two-year programme for graduates of secondary education grade XII. At present, courses are offered in only two fields: agriculture and business administration.

The Department of Vocational Education also carries out girls' vocational training in the fields of home economics; arts and crafts; and business and commerce. Some industrial and agricultural schools and colleges are also open to girls.

Various government organizations run non-formal education, on-the-job training, and apprenticeship training in simple modern skills according to economic, manpower and social requirements. Many vocational training courses are therefore offered to benefit the industrial development of the country.

At present there are 150 technical and vocational schools and colleges under the Department of Vocational Education. They consist of 25 technical colleges, 38 technical schools, 30 home economics colleges, 8 home economics schools, 13 agriculture colleges, 21 agriculture schools, 3 commercial colleges, and 12 polytechnic schools. There are 28 colleges under the Institute of Technology and Vocational Education.

Table 3. Institutions under the Department of Vocational Education and the Institute of Technology and Vocational Education, 1978

Trades	Bangkok area	Up-country region	Total
Trade and industry	11	74	85
Agriculture	1	43	44
Business and commerce	6	1	7
Home economics and Arts and crafts	6	24	30
Polytechnic schools	4	8	12
Total	28	150	178

It is apparent that some technical and vocational graduates are not adequately trained to work effectively. The National Education Policy (1977-1981) is therefore designed in harmony with the requirements of the economy both in terms of quality and quantity. Technical and vocational education curricula are being improved and revised so that graduates at each level will acquire sufficient skills and knowledge to take on a productive job. High priority is also given to administrative and management training courses, including employment-oriented training in general.

In order to emphasize practical training, the Department of Vocational Education assigns students to practise their work according to job operation sheets. Students' products are sold at the Students' Co-operative Store of each school. Students are also trained to work in these Stores, and some practise their skills in actual production work within their schools' workshops.

Evaluation. The outcomes of the curricula can be evaluated by student workmanship and the testing of results. The Department of Vocational Education encourages trade teachers to use instruction sheets and to follow up students' progress from job operation sheets. One problem is that some schools do not have enough facilities and equipment, and some lack qualified teachers. In order to maintain the quality of technical and vocational education, the Supervisory Unit is one of the organizations responsible for the teaching and learning process. This involves the supervision and evaluation of the performance of students as well as teachers, and the implementation of texts or other materials. The Supervisory Unit also occasionally provides pre-service and in-service training programmes to fulfil the objectives of the curriculum.

Technical and vocational schools will succeed in training the manpower needed by modern industry only if they have up-to-date equipment as found in industry, and if instructors are proficient in the latest industrial techniques and understand the newest machinery. These conditions require a large budget, and co-operation from other agencies. Moreover, the increase in enrolment in technical and vocational schools and colleges has not been accompanied by an appropriate increase in the amount of equipment and materials. As a result, the quality of education is not satisfactory. Certain specialized courses provided by technical and vocational education institutions were established without sufficient labour-market information and, as a result, the supply of skilled workers does not match market demand.

The Department of Vocational Education has, however, tried to do as the curriculum planned. The Department will expand enrolment at an average rate of 8 per cent per year for technical and vocational secondary education and 15 per cent per year for higher technical and vocational education, by stressing expansion in the fields of agriculture, technology and industry, particularly short courses in areas related to *agriculture.* With suitable and relevant co-operation from other agencies it can be expected that technical and vocational education will develop as planned.

Innovations and experiments

Agricultural Short-Course Training Project. In the past the education system was not totally in tune with current social and economic realities, nor was it related to the local needs and requirements of the labour market. Although Thailand is predominantly an agricultural country, its education system was not designed to serve the main occupation of the population. As curricula used for various education levels were not self-contained, students tried to continue their education to higher levels, causing a large number of people to leave their original regions and occupations for educational purposes. Besides this, the education they followed trained them mainly for the civil service rather than for the private sector. Because of the above problems, the Department of Vocational Education implemented the rural project with agricultural training mobile units and agricultural short-course training at farm level. The courses introduce new agricultural technology to the farmers and students in rural areas. It is expected that agricultural production will increase, and rural-urban migration slow down. This project will establish ten more agricultural training mobile units and short courses at agricultural schools and colleges between 1982 and 1986.

Project for expansion of agricultural colleges. This project aimed to establish ten more agricultural colleges in 1979, which was a Farmers' Year. The Department also plans to establish 28 agricultural colleges

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throughout the country during the Fifth National Economic and Social Development Plan (1982-1986)

Table 4. Training targets

Year	Mobile units (number of trainees)	Short-course training (number of trainees)
1982	29 250	11 700
1983	33 000	13 200
1984	36 750	14 700
1985	40 500	16 200
1986	44 250	17 700

Polytechnic schools and short courses for Vocational Training. The Department plans to establish seven more polytechnic schools and to provide more short courses for vocational training in rural areas. The target of this project is to prepare people for the labour market and provide additional knowledge for those in rural areas to be able to earn a higher income and raise their standards of living.

In addition, the Department of Vocational Education has a project for training soldiers who have been released from service. It is expected that the trainees will be able to practise what they have learned within a short period of time.

Area Vocational Centre Project (AVC). Most students who complete secondary education look forward to continuing their studies at a higher level. One national education policy is to convince students to recognize the value of manual work. This should be done by providing pre-vocational training in agriculture and industry in the curriculum of primary and secondary schools. The Department of Vocational Education will therefore establish five Area Vocational Centres in 1981, and seven more in the following years. Secondary school students will take vocational courses at the Area Vocational Centres. These courses are self-contained, and on completion, students can transfer credits earned at AVCs to academic courses at their secondary schools. If they do not study for higher education, they will be able to find jobs according to their abilities after graduation at the secondary level.

Programme for Technical Certificate courses. This is a new programme that the Department of Vocational Education set up in 1979. Courses are offered in agriculture and business fields and will expand to the technical and industrial fields in the near future. Study will be of two years' duration after graduation from general secondary education (grade XII).

Improvement of teaching and learning techniques. Most technical and vocational teachers and instructors are not familiar with modern training aids and equipment, and because of this, new graduates are not readily accepted by private enterprises. In order to improve technical and vocational education and training, the Department has assigned experienced instructors to write the job operation sheets of every trade course for students to practise their jobs. Students can then practise manual work effectively and will have the same standard. It is thus expected that they will be better qualified to serve the labour market.

The Department also offers technical and vocational education in the form of part-time courses at skilled-worker and technical levels in technical and vocational colleges. These part-time courses are open to both unemployed and employed personnel to advance their careers or to increase their knowledge in new technologies. After completion of the courses, students obtain a certificate or diploma as in the regular courses.

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UNION OF SOVIET SOCIALIST REPUBLICS

by Ivan Doubov

Structure of technical and vocational education

Soviet public education is a creation of the socialist social system. After the October Socialist Revolution, political, economic and social prerequisites were set up for the development of public education, science and culture.

An important part in the resolution of complex problems in the economic, social and political development of Soviet society is played by the state-run system of technical and vocational education. This has become the main source of replenishing the working class of the country, as was stated in the fundamental law of the State, the Constitution of the Union of Soviet Socialist Republics.

The Soviet State has set up a unified public education system comprised of:

- Pre-school education;
- General secondary education;
- Technical and vocational education;
- Specialized secondary education; and
- Higher education

All of these types of public education are closely and efficiently interlinked, to ensure the natural transition of children and youth from a lower to a higher stage in education. The Soviet school as a unified structure provides for consistent education, and ensures continuity, stability and inter-connection between training, education and the formation of a scientific outlook in young people.

The different types of education feature three separate directions: general education (schooling), directed by the USSR Ministry of Education; technical and vocational education supervised by the USSR State Committee for Technical and Vocational Education; and specialized secondary and higher education controlled by the USSR Ministry of Higher and Specialized Secondary Education. An important position within the public education structure is held by the system of technical and vocational education, which celebrates its 40th anniversary in 1980. It is the basic source of replenishing all branches of the national economy with highly-skilled manpower, and is also an important means of ensuring universal secondary education in the country.

Problems related to the training of skilled workers for every branch of the national economy are handled by the USSR State Committee for Technical and Vocational Education, whose activity is guided by the laws of the USSR, Decrees of the Presidium of the USSR Supreme Soviet, resolutions and instructions of the Soviet Government and other appropriate documents. The USSR State Committee for Technical and Vocational Education implements its policy through respective State Committees of the Union Republics and local vocational education divisions, and supervises schools, organizations and enterprises directly, or via its representative offices.

Technical and vocational schools are controlled directly by regional and city departments of technical and vocational training. The basic tasks of the USSR State Committee for Technical and Vocational Education are as follows:

1. To further develop technical and vocational education in the country, aiming at the systematic training of young people into skilled workers; to develop draft annual and long-term plans of school network promotion on the basis of the proposals of Councils of Ministers of Union Republics and USSR Ministries and agencies, and to fulfil these plans;
2. In co-ordination with the USSR State Committee for Labour and Social Problems, the All-Union Central Council of Trade Unions, and appropriate ministries and agencies, to determine terms of training and lists of trades to be taught at technical and vocational schools and in enterprises;
3. To further improve the standards of training, moral, aesthetic and physical education of students; to improve the preparation of textbooks, training aids and instructions on methods of training;
4. To devise and approve curricula and programmes, instructions and regulations, and control their implementation in training skilled workers;
5. To sponsor scientific research in technical and vocational education; to promote the utilization of recent achievements of science and technology in training skilled workers at schools and in enterprises;
6. To verify fulfilment of the Soviet Government resolutions related to the training of skilled workers in the technical and vocational

education system; to monitor the development of the school network and the status of instruction and tuition standards therein.

The Council is run by the State Committee and includes top managerial staff of the USSR and Union Republics State Committees, ministries and agencies, federal offices and public organizations, as well as scientists, workers and innovators. The Council handles basic matters related to technical and vocational education, training and upgrading of workers' skills. Decisions adopted by the Council in the training of workers are binding for all ministries and agencies, enterprises and organizations.

An important part is played by the Scientific Council of the State Committee which is comprised of scientists, experts in technical and vocational education, and specialists in various fields of endeavour, who discuss and approve draft curricula and programmes, textbooks, instructions on methods of training, audio-visual aids and other materials required for theoretical and practical vocational education.

Directly subordinated to the State Committee are:

1. All-Union Research Institute of Technical and Vocational Education, in charge of research in the field of training and education of young workers;

2. All-Union Scientific Centre of Methods of Technical and Vocational Education, in charge of development of subjects of education, organization and methods of training, and education of students;
3. All-Union Refresher Institute for Managerial Staff and Specialists in Technical and Vocational Education;
4. State Inspection, authorized to inspect all vocational schools in the country;
5. Engineering Pedagogical Higher Schools and Industrial Pedagogical Colleges to train instructors for vocational schools;
6. Specialized magazine "Vocational/Technical Education"; and
7. All-Union Association of Industrial Enterprises, manufacturing technical teaching aids, audio-visual aids, classroom and laboratory equipment.

For better promotion of physical education for students, the All-Union Sport Society "Labour Reserves" was set up.

Technical and vocational schools are classified as follows:

1. Secondary urban and rural technical and vocational schools (3–4 years' duration), at which, after eight years of schooling, students acquire a highly-skilled trade and general secondary education enabling them to enter a higher school or university;
2. Technical schools (up to one year's duration) training general secondary-school graduates as skilled workers;
3. Technical and vocational schools (1–2 years' duration) providing trade training;
4. Evening technical and vocational schools, which provide re-training and advanced training of employed workers.

Basic objectives of technical and vocational schools are:

a) Training for the national economy of all-round technically-educated and cultured skilled workers of a high professional standard, meeting the requirements of today's industry and of scientific and technological progress;
b) Providing trade training and general secondary education in secondary technical and vocational schools;
c) Formation of students in Marxist-Leninist ideology, development of high moral qualities, socialist inter-nationalism, Soviet patriotism, readiness to preserve and multiply revolutionary and labour traditions of the working class; and
d) Aesthetic education and physical training of students, and the improvement of their health.

The scientific and technological revolution of today makes ever-increasing demands on the standard of a worker's skill. At present in the environment of the developed socialist society Lenin's words about the worker being the primary productive force of the society attain a still greater significance. Under the influence of scientific and technological progress the nature of activity changes not only with engineers but also with workers, in whose case mental activity is persistently growing. Education has become not only a most important pre-requisite, but moreover, a part and parcel of the scientific and technological revolution. Thus, objective necessity to expand the scientific and technological revolution provides for development of education and its higher standards.

The USSR, which had a 72-per-cent illiteracy rate before the October Socialist Revolution, is implementing total secondary education today. In 1920 there were 2,000 students enrolled in 43 technical and vocational schools. At present there are 3.5 million people studying at 7,000 schools. In 57 years of Soviet power the system of vocational education has trained over 36 million people, and in the present five-year period alone(1976 to 1980) 11 million people have undergone training. Most enterprises, state and collective farms are staffed by technical and vocational school graduates, and it is they who make up the basic skilled personnel.

The first astronaut, the late Yuri Gagarin, astronaut P. Popovich, the eminent designer of spacecraft S. Korolyov, numerous other outstanding Soviet scientists, artists, top managers of various ministries and enterprises were once graduated from vocational technical schools.

Out of the total of 7,000 vocational schools, 3,676 provide students with general secondary education along with the trade; there are also more than 1,000 technical schools. The trend of development of secondary technical and vocational schools shows that in 1980 they will cater for approximately 90 per cent of the total student body.

Organization

The basic documents for the organization of training and education are the curricula and programmes developed in accordance with State requirements to train skilled workers in different trades. The weekly workload according to the curricula amounts to 36 hours of theoretical and practical training. Twice a year students are granted holidays, two weeks in winter and five-six weeks in summer.

In secondary technical and vocational schools with a three-year term the breakdown of training hours is as follows:

Industrial training	2 100)
General and special technical education	454)
General education	1 584)
Basic aesthetics, physical training	362)
Total	4 500

Classes are held in a variety of ways: combined lessons, lectures, interviews, seminars, laboratory work, individual work with a textbook, written exercises, and guided tours. The instructors make use of technical training aids, audio-visual aids, and educational films. To stimulate mental activity, instructors employ the problematic situation approach. In many schools programmed instruction is used for certain sections or subjects of the curriculum.

Theoretical training provides for the study of special technical, general and socio-political subjects and the basic economy, required for a comprehensive and conscientious mastering of a trade, as well as the ideological and political development of students. Theoretical classes are held in properly-equipped rooms and laboratories with specialized training aids, technical aids and audio-visual aids. In the course of industrial training, students master trade skills, knowledge and habits that are needed to do every operation properly, with the use of modern machinery and advanced practices. For the purpose of practical training, each school has training and production workshops, with modern equipment and tools. Rural vocational schools have at their disposal facilities with plots of land, agricultural machinery and cattle-breeding farms.

An efficient way to improve the quality of trade training of skilled workers is in manufacturing intricate products. This ensures a high quality of industrial training, both in the schools' workshops and in enterprises. Pre-graduate practical training in enterprises to which schools are attached makes it possible for students to operate modern machinery, to acquire an insight into production processes, to master the experiences of innovators and workers, and to get used to life and work in a workers' collective. Industrial training is accompanied by theoretical classes,which favours a better mastering of the programme as a whole.

The Young Communist League (YCL) and trade union students' organizations provide active assistance to instructors, aimed at raising the training standards, improving discipline, and attracting students to a variety of hobby groups and amateur art groups.

Financing

During their term of training students in technical and vocational schools enjoy the support of the State, which covers all expenses. Students are provided with free board (three meals a day), clothing, and scholarships. Upon graduation, they are guaranteed a job and a possibility to continue education in other educational establishments.

Technical and vocational schools are financed from the State budget. Basic requirements for the premises and equipment of schools, their organization and pedagogical personnel, as well as the material maintenance of the students, are specified in Government regulations in force throughout the USSR. A technical or vocational school disposes of a complex of training premises (school building, workshops, and subsidiary premises). According to the Government's decision, the construction of new schools and the expansion of existing ones are financed by the appropriate ministries and agencies.

Links with industry

A specific feature of the Soviet system of vocational education is the close link between schools and industrial enterprises. Each vocational school functions and develops on the basis of an enterprise (called the 'patron enterprise') which helps the school, without remuneration, with equipment, materials and tools necessary for training students, allocates positions for the students' in-service training in the enterprise's workshops, acquaints students and instructors with new machinery and advanced production practices, and provides assistance to schools to repair the premises. During apprentice training the enterprise management ensures safe working conditions for the students, and provides them with working clothes and special catering, if necessary.

Upon finishing their education in a vocational school, students are given a trade qualification, and a category according to the results of final examinations. The state guarantees a steady job for them at enterprises or on state farms. As a rule, school graduates are offered jobs at the enterprises where they did their in-service training. Enterprises that hire graduates grant them paid leave and cover their travel expenses to the enterprise location.

Teacher training and in-service training

In view of a number of resolutions of the Central Committee of the Communist Party of the USSR and of the Soviet Government, much attention has been paid recently to the formation of engineer-pedagogical staff within the system of technical and vocational education. At present, there are growing demands on the responsibility of instructors in the communist-oriented education of young workers and the standard of their socio-political, theoretical and specialized grounding. Engineer-pedagogical staff now employed in technical and vocational schools total 447,600. Instructors of industrial training for a variety of schools are trained in 70 technical colleges run by the USSR State Committee for Technical and Vocational Education.

Teachers of general educational subjects are trained in pedagogical institutes and universities, and instructors in special technical subjects receive their education at the engineering-pedagogical departments of 34 higher educational establishments. In 1979 the first group of students was admitted to the new Engineering-Pedagogical Institute which trains teachers and graduate engineer-instructors in industrial training. A major source of improving the structure of the teaching staff is the employment by technical and vocational schools of experienced workers as tutors. Over ten thousand workers have entered the system of technical and vocational education in this way.

To improve the efficiency and quality of engineering-pedagogical personnel, up to 20 per cent of teachers and instructors at vocational schools undergo a full-time refresher course annually.

In-service teacher training in general educational subjects is done at Teachers' Refresher Institutes under the Ministries of Education of the various Republics; teachers of special technical subjects are usually trained at higher technical schools. Administrative staff of technical and vocational schools refresh their knowledge at the All-Union Refresher Institute for Managers and Specialists in Vocational Education, and also at its branches operating in many cities of the country. Industrial training instructors practise at advanced industrial and agricultural enterprises every three years. During the past three years, over 200,000 instructors, teachers, tutors and managers of vocational schools have undergone full-time courses.

The refresher system is aimed at acquainting teachers and instructors with the latest achievements of pedagogical science, advanced methods of training and education, and experiences of workers in the vocational education system. Every five years, teachers and instructors undergo certification, with the objective of ensuring the further growth of their ideological and political standards, professional and pedagogical skills and creative activities.

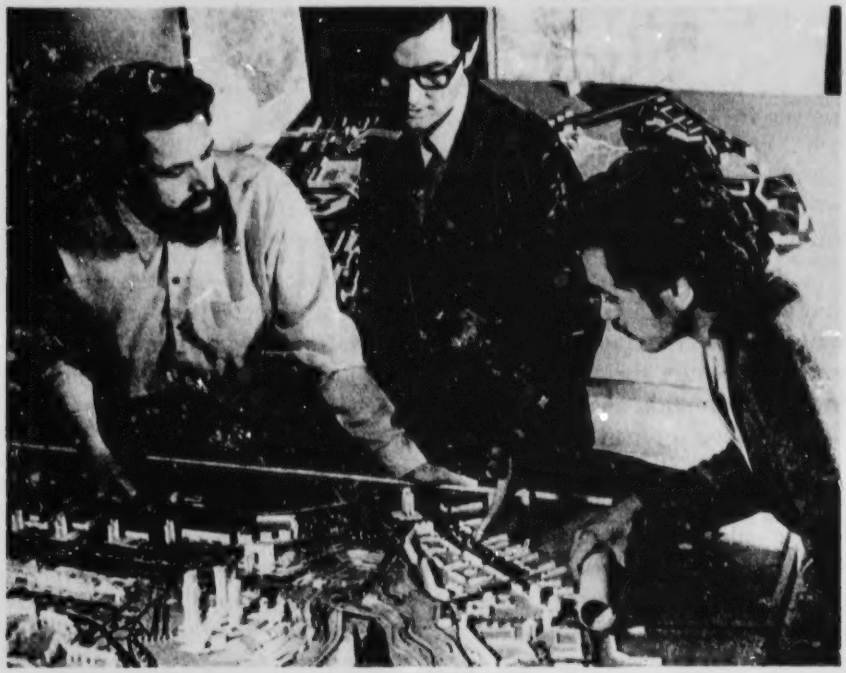
Planning of technical and vocational education

In accordance with Clause 16 of the USSR Constitution, management of the economy is effected on the basis of State plans for economic and social development, worked out taking account of branch and territorial principles, and combining centralized government with economic self-dependence and initiative of enterprises, associations and other organizations. Based on this legislative regulation and within the framework of economic and social planning, the state organizes and controls the training and distribution of skilled manpower for productive and non-productive spheres, in accordance with the demand for personnel and the supply of young people in need of training and employment.

Technical and vocational education in the USSR is organized and planned following the branch-and-territorial principle. The development of school networks, the construction of new vocational schools and the expansion of existing ones are all planned according to this principle In view of the national economy's demands for skilled manpower and the need to complete the introduction of total secondary education, Councils of Ministers of Union Republics develop and approve unified plans to admit graduates of eight-year general schools for the period under planning to technical and vocational schools, specialized secondary schools and grade IX of general secondary schools.

Based on available data on general secondary school graduates in the period under planning, an estimate is made for admitting them to technical schools, specialized secondary and higher schools, and other educational establishments. Plans for training skilled workers in vocational schools are worked out by vocational education bodies together with representatives of the enterprises involved.

In annual, five-year and long-term plans for national economic development, provisions are made for indicators of the network of full-time



technical and vocational schools, their capacity, admittance, number of students and graduates for All-Union ministries and agencies, and for those of the different union republics. Annual and five-year planning in vocational education reflects not only local objectives in the training of a certain number of students in a certain year, but a multitude of measures connected with the admittance of new applicants, the training of previously-admitted students, and the release of workers who have completed a full course within the period under planning. Annual targets of five-year plans are used as a basis for the development of annual plans of economic and social development of vocational schools, and include long-term measures.

On the basis of draft plans developed by vocational schools and requests from enterprises, local vocational education authorities and State Committees of Union Republics for Technical and Vocational Education work out draft annual and long-term plans of training skilled manpower which, upon approval by State Planning Bodies of union republics, are submitted to the USSR State Committee for Technical and Vocational Education.

With the proposals from vocational education agencies of union republics, the USSR State Committee receives proposals from ministries on the number of students, the training of workers and the construction of vocational schools. The Committee studies these draft plans and develops summary annual and long-term plans on the training of skilled manpower for different union republics, ministries and agencies. The plans are then submitted to the USSR State Planning Body and the USSR Council of Ministers. It is important to note that at all levels the plans for manpower training are compiled taking into account future changes in technology and processes, and in the professional composition of workers.

When developing and approv[illegible] plans for the construction of large industrial enterprises, planning and economic agencies first make provision for the construction, equipping and staffing of vocational schools, in order to ensure their functioning quickly and to have an opportunity to train construction men and skilled workers capable of operating and maintraining the proposed enterprises.

Great importance is attached to the popularization of trades and professions needed by the national economy. Labour is remunerated according to quantity and quality, but not below a minimum margin fixed by the state. Differences in the earnings of industrial workers, technicians, engineers and office workers are not significant, and in many cases the wages of highly-skilled industrial workers are *higher than those of others.* *

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* Emphasis added–*Ed.*

A major role in implementing the unified planning policy, and the co-ordination of pre-vocational education with skilled-worker training in vocational schools belongs to the general secondary school where primary labour education and pre-vocational preparation and vocational guidance take place. Training-production combines run by the Ministry of Education introduce students to the basic concepts of modern industry, give them an idea of various trades, develop working habits and direct them towards satisfying the skilled manpower needs in particular areas.

Vocational schools, which also provide vocational guidance, maintain close ties with secondary schools in the neighbourhood through the arrangement of joint socials, 'open-door' days in vocational schools, and exhibitions of artistic and technical creative work by vocational students.

With regard to vocational guidance, a significant part is played also by the press, radio and television. To this end a good deal of work is being done by the permanent Technical and Vocational Education Pavilion at the USSR Exhibition of Economic Achievements.

Future trends

The All-Union Research Institute of Technical and Vocational Education, in a joint effort with research institutes of ministries and institutes run by the USSR Academy of Pedagogical Sciences, studies changes in the nature of work caused by technological progress, and the influence of this on the content and methods of training manpower at schools and in industrial enterprises.

The State Committee for Technical and Vocational Education, together with the State Committee for Labour and Social Problems and the All-Union Central Council of Trade Unions, research centres, ministries and agencies, develops new lists of trades to be the subject of training in vocational schools. Special attention is paid to the elimination of narrow specialization in students at vocational schools. Great importance is attached to the development of combined training, in which a student at a vocational school masters one basic and other related trades. This is of special importance in cases of complex teams working in industry, construction and agriculture as well as when the work is of a seasonal nature.

The resolution of the USSR Communist Party Central Committee and the USSR Council of Ministers "On the further improvement of training and education of students in technical and vocational schools" of 1977 added momentum to the development of the system of technical and vocational education in the USSR. The basic idea of the resolution is that the system should meet to the utmost the demands of scientific and technological progress and the goals of communist construction—and that the educational and training process should be still closer linked to the ideological, moral and labour development of students.

The programme of the CPSU and the resolutions of the 24th and the 25th Congresses of the Communist Party call for the strengthening of international ties to consolidate peace and friendship between the peoples, to combine all peaceful efforts.

The system of vocational technical education makes its contribution to the common cause of development of international economic and cultural relations of our country.

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EDUCATIONAL ATTAINMENT OF THE WORK-FORCE

by Staff of Colombo Plan Staff College

Technical and vocational education may be broadly defined as education to provide skills to enable students to enter a productive vocation and earn their livelihood. More specifically, it is to prepare a student for life, to earn a livelihood and to take up responsibilities of citizenship. If this is so, one may wonder if all education might not be defined in the same way. Is not one purpose of education to prepare a student for working life which also includes earning a livelihood? Then why is there an apparent dichotomy between technical and vocational education, and other forms of education which are termed as general education or sometimes called the 'academic type' of education? What is the profile of educational attainment in the work-force in the region? How does it compare with the profile of the work-force in developed countries? Should not the education of the young be convergent with the educational attainment manifested and therefore presumably required by the work-force?

This article is an excerpt from *A trend paper on curriculum design in technical and vocational education.*

Table 1. Percentage of manpower in the non-agriculture sector by educational attainment

Level of education and countries	Manufacturing	Commerce	Services	Others	Total	
Country A						
Employed in						
Agriculture 69.5%						
Other sectors 30.5%						
Percentage distribution in non-agriculture sector	34.61	13.39	34.09	17.91	100.	
Educational attainment:						
a) Less than high school	33.50	12.25	29.40	16.66	91.81	
b) Completed high school	0.76	0.79	2.65	0.84	5.04	
c) At least one year in college	0.31	0.33	2.05	0.40	3.09	99.94
Country B						
Employed in						
Agriculture 59.74%						
Other sectors 40.26%						
Percentage distribution in non-agriculture sector	29.51	23.91	27.14	19.43	99.99	
Educational attainment:						
a) Less than high school	21.80	15.30	13.91	12.96	63.97	
b) Completed high school	6.01	5.66	5.49	4.95	22.11	
c) At least one year in college	1.58	2.61	8.35	1.37	13.91	99.99
Country C						
Employed in						
Agriculture 81.58%						
Other sectors 18.42%						
Percentage distribution in non-agriculture sector	19.08	32.0	28.24	20.67	99.99	
Educational attainment:						
a) Less than high school	18.16	29.15	22.40	18.70	88.41	
b) Completed high school	1.24	2.49	4.45	1.67	9.85	
c) At least one year in college	0.04	0.22	1.32	0.13	1.71	99.97
Country U.S.A.						
Employed in						
Agriculture 6.92%						
Other sectors 93.08%						
Percentage distribution in non-agriculture sector	29.0	20.81	31.86	18.30	99.97	
Educational attainment:						
a) Less than high school (12 yrs.)	16.88	9.54	14.14	11.17	51.73	
b) Completed 12 years	8.07	7.19	7.94	4.88	28.08	
c) Completed 13-15 years	2.33	2.66	4.03	1.47	10.49	
d) More than 16 years	1.71	1.42	5.74	0.77	9.64	99.94

It appears that conservative values in education continue to persist even in the presence of technological advances and changing demands. Technical and vocational education, in spite of its contribution to the society, continues to be looked down upon as a lower type of education. The clamour for academic general education, whether or not it is relevant to the needs of the present society, continues to exert a major influence on educational policy.

Two tables are presented to illustrate the issue. Table 1 shows the sector-wise distribution of manpower with a specified educational attainment. Three countries which are typical of the region have been chosen, and figures for the United States of America are also given for comparison.

In the countries of the region, the agriculture sector is predominant and employs mostly labour of low educational levels. The figures from this sector would swamp the statistics, and comparison between countries of the region and industrialized countries would become less meaningful. To minimize these effects the sector-wise percentage distribution is indicated separately from the agriculture sector.

The following points related to the realities of educational attainment in the work-force in the region emerge from these figures:

1. A large number of students enter the world of work before completing high school education. This is true even in an industrialized country like the United States.
2. With industrialization and increase in educational opportunities, a larger proportion is likely to enter with high school education.
3. With industrialization there is an emergence of a work-force with higher educational attainment (13-15 years), which is probably of a technical and vocational type (community colleges) and not necessarily of the academic university type of education.
4. The percentage of the work-force which requires third-level education is comparatively low.

Consideration of these points indicates that in the context of developing countries, there is an urgent need to provide vocational skills to students even before the stage of high-school education. Similarly, those who join the work-force after high school need to be prepared for the world of work. Steps should also be taken to prepare middle-level technical manpower at a post-secondary stage. The situation prevailing at present, however, is quite the opposite, as can be seen from enrolment data from most developing countries in the region.

Whereas economic development and the educational attainment profiles of the work-force indicate that the majority of students should be taking vocational courses, the enrolment in this area is insignificant compared to that in general education. The vocational diversification of general education still remains very small in most countries of the region. In spite of the claims of educational planners that they are making the educational system relevant to the needs of society, it appears that education at the second level is still geared essentially to university entrance requirements, rather than to educational programmes to prepare students for the world of work.

Table 2 gives the enrolment ratios in different countries of the region for the third level of education, i.e. percentages of the total 20-24-year age group which is enrolled in tertiary education.

Table 2. Enrolment ratios at the third level of education

Country	A	B	C	D	E	F	G	H
Latest year data	1970	1975	1975	1970	1974	1975	1970	1975
Enrolment ratio 20-24-year age group	3.6	6.6	2.4	8.0	1.9	9.2	1.2	3.5

It is clear from the above figures that the vast majority of the population in this age group has discontinued formal education and is probably already part of the work-force or else seeking entry into it. High-school education as preparation for college entrance thus benefits a microscopic proportion of the population. Yet general education in most countries of the region is continuing to base its curriculum on the tradition of preparation for tertiary education.

It is indeed a major hindrance to appropriate educational policy-making that so little use has been made in countries in the region of analyses such as the above, in particular the attainment profiles of the work-force.

There are, of course, many reasons why students are attracted to academic courses rather than vocational courses and why the educational system would continue to emphasize general education more than technical and vocational education. One of the reasons is conservatism in education. Some subjects are considered to have more

status than others. Traditions die hard, and traditional class distinctions between the elite and the working class, or the white-collar and blue-collar worker, still influence social values. These workers in turn are reinforced by the wage structures and other incentive and reward systems in countries where salaries are geared to the number of years spent in education, preferably academic education.

Apart from the factor of social status, there are other reasons for students not being attracted to vocational courses. In the context of the countries in the region, an important reason is that technical and vocational courses are considered as 'dead ends'. Once the student leaves school and enters the world of work there is too little opportunity for continuing education. Students who have come through general streams can, at least in theory, continue university education on a part-time basis. But for a student who made a vocational choice at an early stage, there is generally no such opportunity. In most countries of the region, the qualifications are treated as inadequate for obtaining admission to higher courses of an academic nature. Except in one or two countries, no universities entertain the thought of providing degrees in (non-academic) vocational fields nor accrediting competencies in the vocational field to academic streams.

A second important issue related to educational attainment of the work-force centres on levels and extents of education within a technical and vocational education course. On the one hand, technical and vocational education is aimed at developing saleable skills which can be used in productive work. On the other hand, the students must be given general education at par with other forms of education so that they have further opportunities for development. The issue is: what proportion of each should be emphasized? Similarly, what should be the extent of skill development so that the student will be immediately productive? Is this feasible in the time available in a course? Is it to be in a narrow field of specialization or should it be applicable to broad fields? These and many similar issues are involved in framing policy objectives related to educational attainment of the work-force and hence the attainment provided by technical and vocational education. Undoubtedly the decisions will depend upon the conditions prevailing in different countries, and specific policy objectives may differ.

Some of the revised recommendations adopted by the Unesco General Conference at its Eighteenth Session in Paris may form the basis for the development of desirable policy objectives. Specifically, recommendations in paragraphs 6 and 7 of the report as reproduced below may be used by policy-framers as guidelines.

> No. 6. Given the necessity for new relationships between education, working life and the community as a whole, technical and vocational education should exist as part of a system of life-long education adapted to the needs of each particular country. This system should be directed to:
>
> a) abolishing barriers between levels and areas of education, between education and employment and between school and society through:
>
>   i) the integration of technical and vocational and general education in all educational streams above primary level;
>
>   ii) the creation of open and flexible educational structures;
>
>   iii) the taking into account of individuals' educational needs and of the evolution of occupations and jobs;
>
> b) improving the quality of life by permitting the individual to expand his intellectual horizons and to acquire and to constantly improve professional skills and knowledge while allowing society to utilize the fruits of economic and technological change for the general welfare.
>
> No. 7. Technical and vocational education should begin with a broad basic vocational education, thus facilitating horizontal

and vertical articulation within the education system and between school and employment thus contributing to the elimination of all forms of discrimination, and should be designed so that it:

a) is an integral part of everyone's basic general education in the form of initiation to technology and to the world of work;

b) may be freely and positively chosen as the means by which one develops talents, interests and skills leading to an occupation or to further education;

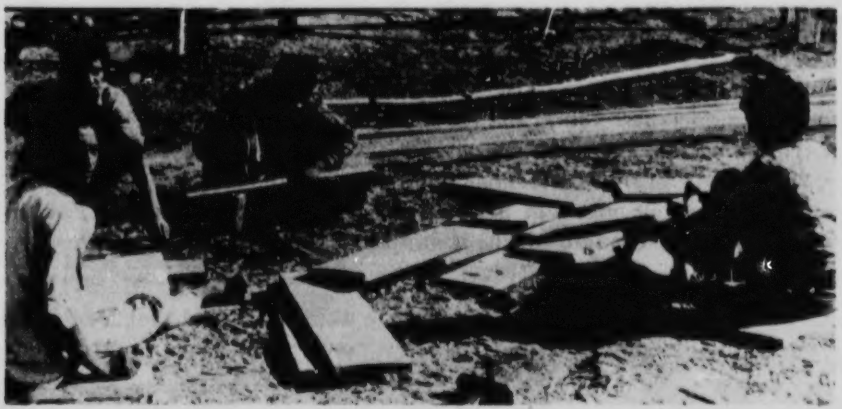
c) allows access to other aspects and areas of education at all levels by being grounded on a solid general education and, as a result of the integration mentioned in paragraph 6 (a), containing a general education component through all stages of specialization;

d) allows transfers from one field to another within technical and vocational education;

e) is readily available to all and for all appropriate types of specialization, within and outside formal education systems, and in conjunction or in parallel with training in order to permit educational, career and job mobility at a minimum age at which the general basic education is considered to have been acquired, according to the education system in force in each country;

f) is available on the above terms and on a basis of equality to women as well as men;

g) is available to disadvantaged and handicapped persons in special forms adapted to their needs in order to integrate them more easily into society.



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EFFECTIVE USE OF LEARNING RESOURCES IN TECHNICAL AND VOCATIONAL EDUCATION

by Jeoung-Keun Lee

Introduction

It is commonplace today to remark that a revolution in education is taking place. This observation has been made many times in the history of education, as schools have responded to the fertile thinking of such leaders as Locke, Rousseau, Pestalozzi, Dewey, and many others, as well as to social changes occasioned by historical events such as the Industrial Revolution, world wars, the current space race, the emergence of cybernetics, and many more. Change is always with us, and it is always mirrored in the schools.

Among the most significant forces for change in recent years is the technological sophistication we now possess, for this sophistication not only affects our lives in profound ways but also seems to hold tantalizing promise for increasing our efficiency in education (Kinder, 1973). The last 80 years have seen the development of steam-driven, high-speed rotary presses, advanced optics, films, wire and tape sound recordings, simple and complex duplicating and copying machines, radio, television, computers, and communication lasers.

This technological escalation has bestowed upon education a proliferation of equipment and materials which can assist in the reorganization and redefinition of educational experiences. In the past, most teaching depended almost entirely on verbal communication between teacher and student, or written communication to the student from printed materials. Although these communication channels continue to play important roles in the learning process, today's students are learning facts, skills and attitudes from pictures, television, recorded words, programmed lessons, and other media. Once technology enters the school building, dramatic renovations usually begin. With the technological magic touch, a simple school-house turns into a systematized learning centre.

Today, many countries around the world use some form of technological media in education. In a few countries the use is fairly widespread. Most technological devices and programmes, however,

are structured around the needs of the teacher and are employed as teaching aids in the classroom. In other words, most educators are using technology to answer the question : how can technology help the teacher? In a few areas, however, focus is on the needs of the student. There, educators ask the question : how can technology help the learner?

In the instances where the student is the centre of attention, technology is a catalyst for educational change. Its absence would make a significant difference to the educational process, because technology is an integral part of a well-thought-out system, not merely a teacher's aide. The main theme of this paper is therefore to discuss how learning resources, using modern technologies effectively, help vocational students to learn more.

Effective uses of low-cost media

Leaders in technical and vocational education recognize that with the stupendous advance in technology, technical and vocational education programmes in schools are in tremendous need of new and up-to-date teaching materials to keep abreast with industry. Not only is there a need because of technological advance, but also in terms of conservation of human resources due to expanding school enrolment.

In this sense, some questions need to be answered. They are : (1) How do we keep the programmes of vocational education up-to-date in subject matter? and (2) How do we help the already-overburdened teacher to keep up with technological advances and improved teaching procedures?

Understanding is a developmental process which can be conceived of as occurring on three successive levels. It is an oversimplification, however, to say that learning can take place only at three levels. Obviously there are many levels, but in broader terms the three stages mentioned appear to stand out. The first level is the first-hand-experience level, the grass-roots level of experiencing, where misunderstanding is at a minimum. Vicarious experience, the basis of the second level of understanding, is used extensively as a substitute for real-life experience in the modern school. Understanding on the third level depends on abstraction. The focus of this section is on vicarious experience.

In addition to reading, vicarious experience can be gained from still pictures, films, filmstrips, resource persons, simulations, mock-ups, television, and the like. The more concrete and realistic the vicarious experience, the more nearly it approaches the learning effectiveness of the first level. Of course, unless the learner realizes that he is dealing with a substitute, his learning may not be comparable to that of real-life learning.

Interest in the role of the senses in learning was already afoot in educational circles when instructional media began their ascendency. It has long been recognized that the various senses condition the reception of messages in the communications act. Research done by Cobun (1968) indicated that:

1 per cent of what is learned is from the sense of taste.
1.5 per cent of what is learned is from the sense of touch.
3.5 per cent of what is learned is from the sense of smell.
11 per cent of what is learned is from the sense of hearing.
83 per cent of what is learned is from the sense of sight.

Retention of what is learned is likewise related to sense experience. Observation and research by Cobun tended to show, holding time as nearly constant as possible, that people generally remember:

10 per cent of what they read;
20 per cent of what they hear;
30 per cent of what they see;
50 per cent of what they hear and see;
70 per cent of what they say; and
90 per cent of what they say as they do a thing.

These figures on the relative importance of various senses to learning and retention are only approximations, yet it is clear that learning and retention are inextricably interwoven with the mode of instructional communication used. Therefore, one may ask the inevitable : what kind of media are most effective and cost less in teaching vocational subjects?

Based on cost and effectiveness, a systems-analysis of training requirements by KEDI resulted in a comprehensive training package including motion pictures, diagrams, worksheets, guides and other integrated materials such as sound filmstrips. Some of the sound filmstrips must be used by the trainees as they work on the actual equipment at the usual bench or job location. This procedure of moving learning resources out of the centre to the learner will be increasingly important in technical and vocational education.

Learning resources, including the professional services of personnel, are finding their way to the places where learning can most efficiently take place. It may not always be at learning-resource centres. This is equally true in industry where a desired change in skill accompanies a desired change in information and attitude. Supervisors of training in large companies are saying that adequate training can be achieved most efficiently by providing the learning resources at the trainee's usual working location.

The following unheralded and largely unnoticed changes in learning resources have served as progenitors for subsequently-discovered changing emphases in education (Sherman, 1967).

From	To
Audio-visual materials as an aid to the instructor	Educational media as resources for the learner
Audio-visual materials as additive or supplementary material	Media as basic instructional resources
Audio-visual materials as isolated piecemeal productions	Integrated, systematized media and procedures
The need for an audio-visual specialist as an implementor	The need for many types of specialists, especially as members of teams to design and evaluate learning experiences
Classroom arrangement	Learning laboratory arrangement with media, equipment and specialized personnel

Finally, we may raise a question regarding technology : can the new technologies help improve curriculum, make education more responsive to individual students, reach more people, and fill gaps left by a shortage of trained teachers?

At present there are no simple nor indisputable answers to this question. There are, however, indications that, while technology is not an instant cure for the crisis facing education, when properly used it can increase the effectiveness and productivity of the educational process, multiply the impact of the effective teacher, and thus improve learning.

Effective use of facilities

No decisions required of the school administrators are quite as costly, quite as visible, nor more lasting, sometimes embarrassingly so, than those involved in school construction and modification. Most educators agree that facilities play a significant role in the learning process, but most are willing to accept whatever the current environment has to offer. Those with new schools are fortunate. Those who must cope with older and less comfortable schools must wait and do the best they can with what they have.

Modern construction and modification alternatives offer a flexibility that was not available in earlier designs, by providing open spaces, movable walls and partitions, and small- and large-group-learning pods and areas that may serve a host of activities and subjects. One must remember that the facility that is being built or modified will be there for a long time into the future. Plans should therefore be developed on the basis of what can be learned about current programme needs, but also should contain built-in flexibility to meet future needs.

Current needs can be formulated from evaluation of the strengths and weaknesses of existing facilities and exploration of alternatives without construction or modification, from which consideration of construction or significant modification specifications can be derived. The basic designs should be chosen from existing plans if possible. Visiting similar facilities in other institutes can be of particular importance if there is a school with experience in implementing similar instructional programmes or philosophies. The high cost of school construction or modification justifies detailed and careful planning, as well as travelling expenses or consultant funds, to make sure that the school does not make costly errors or end up with unsuitable facilities.

No matter which type of programme is planned, certain considerations must be made. These considerations are : environmental control factors, utilities selection factors, storage factors, equipment selection factors, space utilization factors, structural detail factors, auxiliary laboratory facilities, and health and safety concerns (Moon, 1975). Among these factors, major emphasis will be placed on space utilization factors, since planning floor spaces wisely can save money for the school.

In planning floor space, there are two important concepts to consider : space-sharing and materials flow. In general, there are two classes of shared-space programmes that are of special interest in developing programme flexibility. These two classes are station-sharing programmes and space-sharing programmes. The 'station-sharing' refers to the use of one station to provide the same activity to several different instructional programmes.

In addition to the sharing of instructional and support service-systems (station-sharing), major space-saving can be made by designing for the shared use of the same physical space (but not necessarily the same facilities) for a variety of activities. There are three types of such 'rotational stations': (1) sequential programme rotation, (2) programme/storage rotation, and (3) overlapping programme rotation.

The flow of materials within a laboratory should be planned so that the movement is from one basic operation to another in a reasonably logical sequence. The general flow would be from storage room to processing area to fabrication area to finishing room to finished product.

No matter how well the programme is planned, costly technological changes, like school buildings or furnishings, may have to be phased-in over a period of years, using evaluative input as a corrective factor for each year's programme.

Another course of action for long-range changes is to introduce the programmes for technological innovation into the country by incorporating them into the planning and construction of new schools. This (a) permits the design of learning spaces and the technological system on a co-ordinated basis, (b) is an easier bite to manage and evaluate, (c) offers a psychological advantage to a new staff in a new environment and (d) permits the innovation to take its proper place as an integral part of a schoolwide new instructional programme rather than as a limited effort conducted in an otherwise conventional setting.

Conclusion

The educational task ahead of the developing countries would be a great challenge in its sheer magnitude, even if the countries were not hindered by the constraint of resources. The problem of financing educational development with limited resources has in the past proved to be a major impediment to faster progress.

Wastage has been the most frustrating experience for the developing countries: in diminishing the educational output it lowers the rate of return on investment in education. Not only does it increasingly waste scarce resources, it slows down the pace of progress toward the goal of modernization.

The various educational inputs, including students, teachers, and various parts of the education's production mechanism, act and react with one another. The efficiency of the production mechanism is heavily dependent on the quality of the human resources, influenced by the social and economic environment of students and teachers, the habits and attitudes they bring with them, and the incentives within and outside the system that motivate them (Huq, 1975). These major variables are not as tangible as physical inputs such as housing, equipment, books, and laboratories, but they are probably more important to the proper articulation of the system.

The human dimension in the production function of education makes educational systems fundamentally different in certain aspects from systems concerned with non-human products: (1) even assuming that the aims, contents, and methods of education are reformed in an appropriate manner and that all modern aids to education are available and used, the education industry will still remain labour-intensive; (2) human raw materials are not passive inputs - they play an active role in the quality of the final product by their will and effort, and the skill and knowledge they learn in one stage will aid them in acquiring other skills and knowledge at a later stage.

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PRACTICAL SPACES FOR TECHNICAL AND VOCATIONAL EDUCATION: AN ARCHITECTURAL DESIGN DILEMMA

by D.J. Vickery

Introduction

Technical and vocational education in the countries of the Asian region may now be approaching a period of reform and reorganization similar to that which, during the past three decades, has changed primary and secondary general education. This short article reflects on the relevance to the needs of the young, skilled worker of practical spaces in the technical and vocational schools of the region.

The facilities of the 1970s

Typical institutions for training technicians and craftsmen of both sexes in the countries of the Asian region comprise classrooms, laboratories, large practical spaces, common areas such as library, administration offices, stores, toilets and often a dining facility and kitchen. The main difference between facilities in technical colleges and vocational schools is usually in the scale of provision of practical spaces. A vocational school which offers training to plumbers, bricklayers and carpenters will usually provide more periods of workshop practice and thus need more workshops, than an institution for training building technicians.

Practical spaces usually take the form of wide-span, single storey buildings while the remaining accommodation is often grouped in multi-storied form. The two sets of structures are frequently separated in order to prevent noise from the practical spaces disturbing those engaged in quieter activities in classrooms or laboratories.

Figure 1 shows the general arrangement of a vocational school, typical of many in the countries of the region. Figure 2 provides a larger-scale detail of one of the workshops.

Because of the large areas of the single-storey practical spaces, and of the need for roads to deliver materials to them, the sites for technical training institutions are usually much greater in area than those for general education having similar enrolments. The location of a site for a technical or vocational school is often extremely difficult,

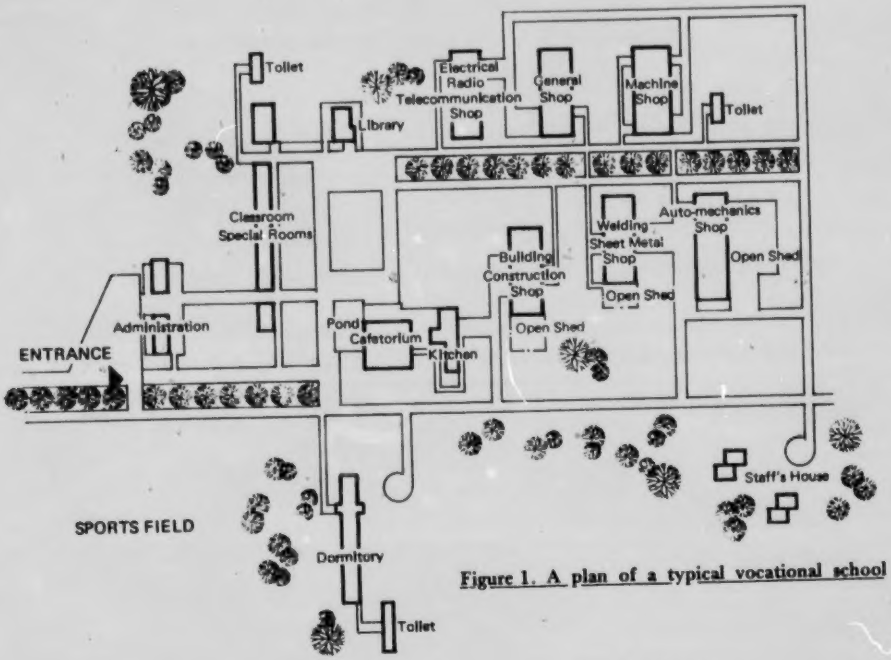
Toilet
Electrical
Radio
Telecommunication
Shop
General
Shop
Machine
Shop
Toilet
Library
Classroom
Special Rooms
Auto-mechanics
Shop
Welding
Sheet Metal
Shop
Open Shed
Open Shed
Building
Construction
Shop
Open Shed
Administration
ENTRANCE
Pond
Cafetorium
Kitchen
Staff's House
SPORTS FIELD
Dormitory
Toilet

Figure 1. A plan of a typical vocational school

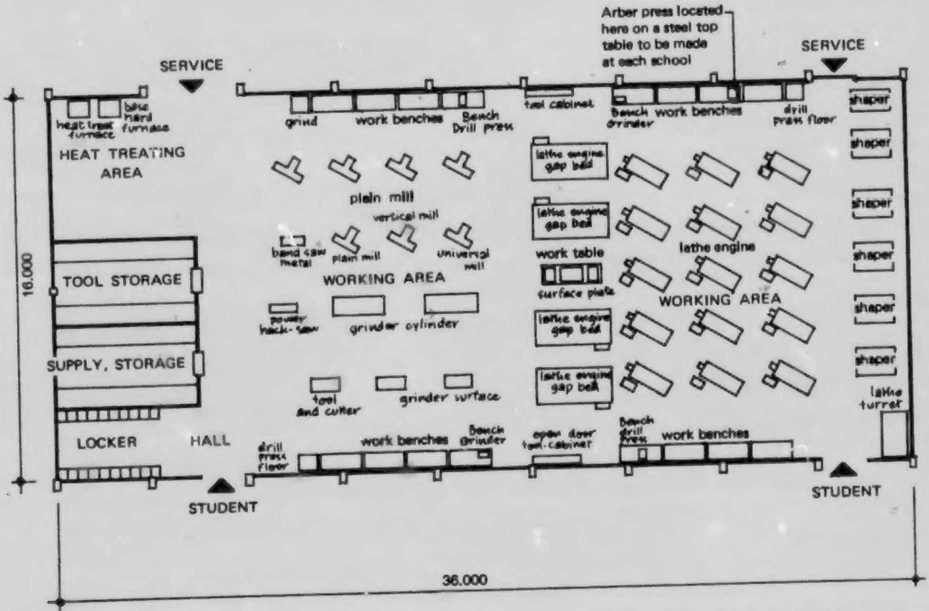
Arber press located here on a steel top table to be made at each school
SERVICE
SERVICE
base hard furnace
heat treat furnace
HEAT TREATING AREA
grind
work benches
Bench Drill press
tool cabinet
Bench Grinder
work benches
drill press floor
shaper
shaper
shaper
shaper
shaper
shaper
lathe turret
plain mill
vertical mill
band saw metal
plain mill
universal mill
WORKING AREA
lathe engine gap bed
lathe engine gap bed
work table
surface plate
lathe engine gap bed
lathe engine gap bed
lathe engine
WORKING AREA
TOOL STORAGE
16.000
power hack-saw
grinder cylinder
SUPPLY, STORAGE
tool and cutter
grinder surface
LOCKER
HALL
drill press floor
work benches
Bench Grinder
open door tool-cabinet
Bench drill press
work benches
STUDENT
STUDENT
36.000

Figure 2. Detail of a machine shop

as such sites require nearby supplies of three-phase power, water and, if possible, gas. Finally, sites for schools which train technicians or craftsmen, if located near industries, will benefit students enormously because of the opportunities they may provide for study visits, apprenticeship training, and eventually for employment.

It will be evident from these site-location criteria that technical and vocational schools will often have to be built on land of high commercial value, such as that sought after by commercial interests wishing to establish factories. It is of course possible to provide sites for technical schools on cheaper land in the rural areas and this indeed has been the policy in several countries. In such cases, it is first necessary to provide boarding accommodation for the students. Second, it is apparent that they may be deprived of the close contact with industry which is essential to their practical training. It is to be doubted, moreover, that the total cost of a rural industrial institution, when it includes the costs of boarding, is significantly cheaper than that of an institution on an expensive urban site. Schools of agriculture are probably the only example of technical institutions that are truly suited to relatively remote rural sites.

As is well known, the capital and recurrent costs of technical and vocational education are high in comparison with those of upper-secondary general education. The cost of land is one reason for this; another is the cost of large-span workshops and of the complex, built-in services that are needed for the operation of machines and other equipment. Frequently too, the cost of the machinery and equipment itself is in the region of 50 per cent of the total capital investment.

There seems little doubt that high costs, both capital and recurrent, are one of the main reasons for the relatively slow development of technical and vocational education in many countries of the region. Now, in the changing economic context, there is a rapidly-increasing need for skilled craftsmen and technicians. This is being matched by efforts to train more technical teachers, to develop curricula and to find resources for new facilities.

In view of these developments, it would seem an appropriate moment to evaluate the sort of facilities, and particularly those for practical work, that have been described above, against the industrial background in the region at the start of the 1980s.

The 'real-life' situation

A critical observer, familiar with some of the typical industries in Asia and with current practices in technical and vocational education might perhaps note some of the disparities between workshops in the schools and those of the factories. Such disparities give rise to some interesting questions.

A good point of departure for the discussion is a statement made in recent months, to the effect that education should be based on content, "derived from real-life situations . . . and . . . the development of skills, attitudes and values required to survive in a competitive, and even at times, outright hostile society." [1]

Written with reference to education at the first level, this statement seems overwhelmingly appropriate in relation to technical and vocational education which prepares students for a world of work where survival depends on the skilful exercise of frequently complex, technical functions.

What are the 'real-life situations' in industry in Asia today? The spectrum ranges at the one extreme from the most modern factory, through the many enterprises employing smaller groups of people, to the type of industry in which a mere handful of craftsmen, often a family, provide the skilled labour. The last of these categories is by far the most common and it is the small, family industries that meet the domestic needs of many countries of the region.

Included in this last category are even found small concerns engaged in such sophisticated work as metal-working of various sorts, electrical engineering, radio and television repair, printing, motor vehicle repair, weaving, rug-making, tailoring, metal-casting, catering, building, leather-work and dozens of other activities which require a high degree of skill and often long training.

The photographs which illustrate this article are examples of small, metal-working shops in which modern machinery is in daily use. They are but three of several dozen or more small industrial workshops to be found within a kilometre of the Unesco Regional Office in which this Bulletin is being printed. Similar workshops will be found in large numbers in almost every town in Asia.

The point sought here is that conditions and the nature of the work in large, modern factories, differ considerably from those of an industry operated in a small workshop of the type mentioned above. The question therefore concerns the extent to which these differences

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1. Dave, P.N. *Developing relevance-based learning materials.* Paris, Unesco, 1979. (Unesco-UNICEF Co-operative Programme. Aids to Programming UNICEF Assistance to Education, N.S. 12)

should find reflection in the course offerings and physical facilities available in the technical and vocational schools.

Large, bland workshops in the sort of technical training facilities described at the start of this article originated in the more developed countries. There, the background to technical and vocational education is quite different; the student is more often than not an apprentice, based in industry and attending a technical institution perhaps one day a week or for short 'blocks' of several weeks, sandwiched into his or her normal years' work in the factory. Such a student is, through practice, easily able to relate experience at school to experience at work. The practical facilities at school, moreover, will not usually differ greatly from those of the factory. Even the teacher is likely to be a specially-skilled technician, drawn from industry and teaching, part-time, in the evening sessions of the course. In this case, education may reasonably be said to be related to 'real-life situations'.

In several countries of the Asian region, these conditions also obtain but in the majority they do not. Technical and vocational education is normally a full-time occupation. The students, having completed their general education, opt for a technical or vocational course and attend school, and school only, for a prescribed period. They are often taught by teachers who, themselves, have been similarly educated, succeeded well in examinations and become professional educators. It is at the end of such an education that many students enter the world of work.

Do they then find that their educational experience matches the 'real-life situation'? If they are employed in one or other of the small workshops that form the majority of the industrial enterprises in the region, (or even if they move into technical posts in such varied occupations as printing and the graphic arts, engineering concerns or medical clinics) the answer is likely to be in the negative.

Workshop disparities

What, from a strictly physical point of view, are the differences between a typical school workshop and a small, commercial workshop? The following would, it is suggested, be immediately evident, even to a lay observer:

1. Space. Much more space is available for each technician in a school workshop than in a commercial workshop.
2. Posture. Students often stand to perform tasks in school, unlike a commercial setting where they might normally prefer to or have to squat or sit.

3. Illumination. Much higher levels of illumination usually exist in school workshops than in industrial workshops which are often dark (and dirty).
4. Products. In a commercial workshop, the man or woman has to work surrounded by the raw material and the products made from it, whereas a school workshop floor is usually clear of materials and products.

It must be said at this point that it is not the intention to argue here that school workshops should be designed to resemble physically the small workshops of industry. The methods of education require provision of certain spaces and certain items of equipment that are essentially for learning to take place using the skills of the educator and the technology that is available. What is argued, however, is that the design of workshops in Asian vocational and technical schools during the past two decades has done little more than stimulate workshop design of the highly industrialized countries and thus create an educational ambience which reflects a 'real-life situation' very different from that of the small workshop described above.

This article suggests no solutions to the problem it poses, for these would result from study and experiment. It is however worthwhile to examine some of the implications of the four differences listed above. As the work facility has to 'fit' the craftsman and his equipment, the first difference logically to be considered is that of posture.

It is interesting to speculate on the form that might have been developed for a metal-working lathe had the lathe been invented in Asia, rather than in Europe. The bed of the modern lathe is at a height above floor level which forces the operator to work at it while standing. The lathe is, in fact, raised to this height on (expensive) metal supports. Had such a lathe first been designed in Asia and for Asians, it seems likely that the bed would have been at a much lower level so that the operator could have worked in the squatting or sitting position. The lathe itself gains nothing in efficiency from being either higher or lower and its height is thus nothing more than a 'cultural' component resulting from the work-habits of the people of the countries in which it was designed.

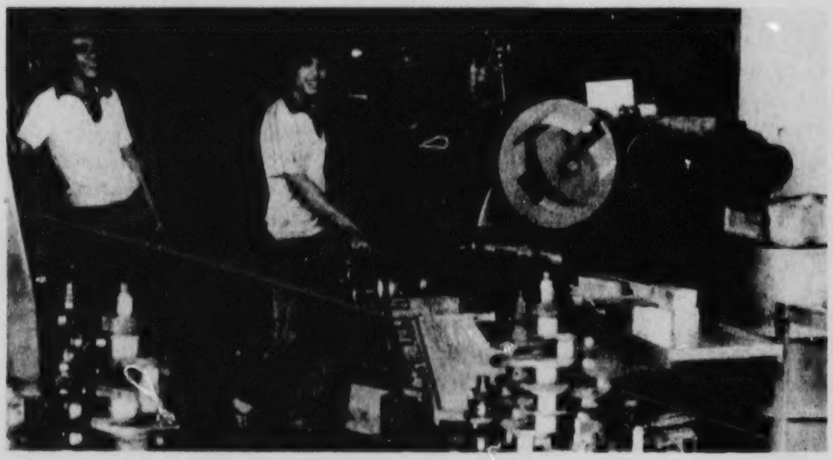
It is not likely (although it is conceivable) that the design of lathes will be changed for Asian technical and vocational schools. The idea is, however, relevant to other aspects of training. If a survey of local practices showed that skills such as woodwork, leatherwork, television and radio repair, tailoring and the like were normally practised squatting or sitting on the floor or on small, raised platforms rather than at benches, then a strong case would exist for learning these skills in similar conditions of work in the practical spaces in technical and vocational schools. The space requirements would, of course, be quite different from the requirements for working in the standing position. Immediate storage of tools and materials, for example, would need to be at a lower height as well.

The implications for the teacher would also be significant. He or she might no longer need to stand to teach. Sitting on a raised platform might be more convenient. To this there might, however, be much resistance, for it will be recalled that few teachers have actually worked in the same industrial conditions as their students, having entered the teaching profession directly after secondary general and teacher education. Their training will thus probably have been in workshops based on European prototypes. Would such a change in the form of the workshops be acceptable? As is the case with most aspects of teaching practice, a teacher will employ those methods practised in the teacher-training colleges. It is these institutions, therefore, that might have to lead the way in introducing reforms of this nature.

The second difference between the workshops of industry and those of the educational institutions is that of space. A school workshop has certain spatial requirements that result from the needs of education per se. For example, it is often useful, from time to time, to gather the students together at some point in the workshop so that they can watch a demonstration by the teacher of a particular skill or participate in a short discussion related to the current activity. Beyond this, however, there is no strong case to be made for the kind of provision of space (often lavish by industrial standards) that characterizes the workshops of some educational institutions. What is needed, perhaps, is a survey of small workshops to define the amount of space that industry requires in order to perform its functions. These data would not only provide a guide to the workshop designer, but also enable discussion on design to be pursued with educators in a more realistic context than is often the case.

One has, in this connection, to consider why the workshops for small industrial enterprises are so small. The reason is simply that the cost of machinery is fixed and the only possible savings are in the accommodation itself, which is made as small as is found practicable by those using it. In this region, much of the work is done on the ground floor of a single unit of a 'shop house'. The work as it increases then overflows into the alley, or the street - or another unit if the enterprise prospers. The constraint of the budget seems somehow to be less severe in education than in industry.

The educator, it is suggested, really has two tasks in training a student to use a piece of equipment. The first concerns the use of the equipment itself and the second concerns how to arrange it and use it in the sort of space that is likely to be available in a 'real-life situation'. If, for example, the educator teaches the student how to use a lathe in a large and spacious workshop, he may in fact be performing only part of his function.



The third difference between educational and industrial workshops is in the materials and product-storage aspect. In most vocational schools, the store is a sort of sacred place with a lock on the door and often a separate guardian to look after it. In at least one country of the region, students are provided with materials for exercises and, at the end of the lesson, have not only to return the project piece, but also the waste so that the original weight of material can be accounted for by the storekeeper. The point is that design can do little to assist in the development of 'real-life situations' when the administrative practices of storekeeping and accounting remain so unreal.

Both storekeeping and accounting are very important in industry and are thus important in the education of the craftsman who, in a small industry, might well have to perform both functions. Once industrial practice in the matter is studied and understood, it might be possible to free the students from the tyranny of the storekeeper and to improve their own capabilities in this important area.

Finally, the school can and should do much to educate the student in respect of those aspects of industry which affect health and welfare. Educators are usually very good at ensuring that safe practices of work are adopted. The use, for example, of goggles when welding or grinding is a part of the welding curriculum in all countries. Safety finds repeated emphasis in all practical teaching. Similarly, most school workshops are well lighted. Large windows provide daylight and in overcast conditions, there is ample electric light. By contrast, many of the small workshops employing a handful of people in the towns of Asia are badly lighted. Bad lighting imposes eyestrain and results in discomfort. Further, of interest to the employer is the well-established fact that, within certain limits, the performance of the task can be improved by better lighting. This has a financial impact on the enterprise and it should encourage the proprietor to invest in more electric lights, or suggest that it would be worthwhile to put more windows in the workshop or, at least, suggest that the task should be arranged as near as possible to the existing sources of light. Training in use of lighting should be given by the school.

If an appreciation can be formed of the real conditions in industry, the school designer may be able to design school workshops that more closely resemble the small industrial workshop and thus enable these aspects of health and welfare to be brought out - a situation which is not possible in most present technical and vocational workshops.

One method by which this and other similar problems - such as that of providing water and sanitation - could perhaps be brought out more realistically might be by giving students the opportunity of arranging their work in conditions that differ not too greatly from those that obtain at their actual places of work. Guided by a sensitive and informed teacher, they would then perhaps have greater confidence in education as being both related to them and to the real work they are doing.

For the teacher training colleges as well as for the designers of technical and vocational institutions, there is a great deal of investigative work to be done. In the first place, it would be necessary to make a thorough study of a range of small, local workshops. Drawings and records of activities might enable designers and educators to adopt a fresh view of the problems of provision of space and storage and perhaps to develop workshops for education in which these problems are truly reflected in the design and teaching practices of the future. In so doing, it seems more than likely that much smaller spaces for school workshops would be shown to be needed, and that resulting savings would enable education authorities to build more technical and vocational schools and institutes.

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NEW PERSPECTIVES FOR TECHNICAL AND VOCATIONAL EDUCATION IN NATIONAL ECONOMIC DEVELOPMENT

by L.S. Chandrakant

All development studies have rightly emphasized the importance of science and technology as a means of accelerating economic growth. I do not therefore need to argue the case for the intensive application of science and technology to increase agricultural and industrial productivity. For all of us in developing countries the immediate issue is how we are going to build up our capability to manage science and technology in our own national settings.

Implicit in this issue are two related aspects: first, what is the current level of technical manpower resources of our countries? second, what are the new directions in which we should designedly move to meet future needs in step with advancing technology? These questions are examined below with particular focus on technical and vocational education systems. The general methodology followed is to apply certain objective indicators to enable us to understand, qualitatively and quantitatively, how the systems are planned, implemented and evaluated, what are the emerging problems and how they are being resolved.

The national settings

The setting for this article is the countries of Asia and Oceania. These countries are disparate and are characterized by varying degrees of imbalance:

1. In the kinds and abundance of fuel and mineral resources;
2. In the availability of water for power and irrigation;
3. In climatic conditions and population density;
4. In dependence on agriculture and in degrees of industrialization;
5. In income per capita and in capital resources;
6. In the state of educational development; and
7. In the restraints imposed by inherited traditions.

Each country must therefore evolve its own approach to problems of national development.

Although these countries have many diversities, the general strategy of development is nevertheless the same, because they share the same deeply-rooted economic and social problems: low levels of productivity, income and living; a high proportion of the population dependent on agriculture; large-scale unemployment and under-employment, dependence on more advanced countries for capital equipment and technological know-how and an inadequate rate of economic growth. In some countries the problem is identified by a high birth-rate which offsets whatever economic gains are realized. A high growth-rate can confer benefits and improve living standards only if population increase is drastically checked. This demands not merely a massive economic effort, but a social discipline as yet not firmly established in our culture.

The countries of the region realize therefore that a central focus of economic development effort is the intensive application of science and technology to increase agricultural and industrial productivity. Yet they recognize at once that the mere availability of science and technology does not guarantee that economic development will occur automatically. If science and technology are to contribute to productive processes, special talents must be developed. The people must be trained to apply the knowledge and techniques effectively on a broad front. Hence the availability of people with the necessary skills and capabilities determines the pace of development. The most important investment our countries may make, whatever their stage of economic development, is in their human resources: in the education and training of people and in energizing them for productive work.

Although development in the sense outlined above is a well-accepted concept, most of these countries have tended to emphasize material inputs and capital formation in their development strategy. There is little doubt that the creation of irrigation, power, transport, mining capacity, coal and oil, steel, fertilizers and machine building capacity are all prerequisites to economic development. But these alone do not constitute a sufficient condition of economic growth. These instruments of production must be effectively utilized by the people, and the people must be trained and motivated to that end. We must strive for the maximum output of goods and services from the available developmental facilities and material inputs through a greater response ratio of the human factor.

There is another important aspect of development which is particularly significant to countries of Asia and Oceania. This is to provide adequate access to employment to all sections of the population who are unemployed or under-employed. Not only do unemployment and under-employment deny large sections of the population full satisfaction in life;they are also barriers to further development. In our countries, unemployment is turning into a major social problem and an obstacle to development. The failure to create meaningful employment is the most tragic feature of development.

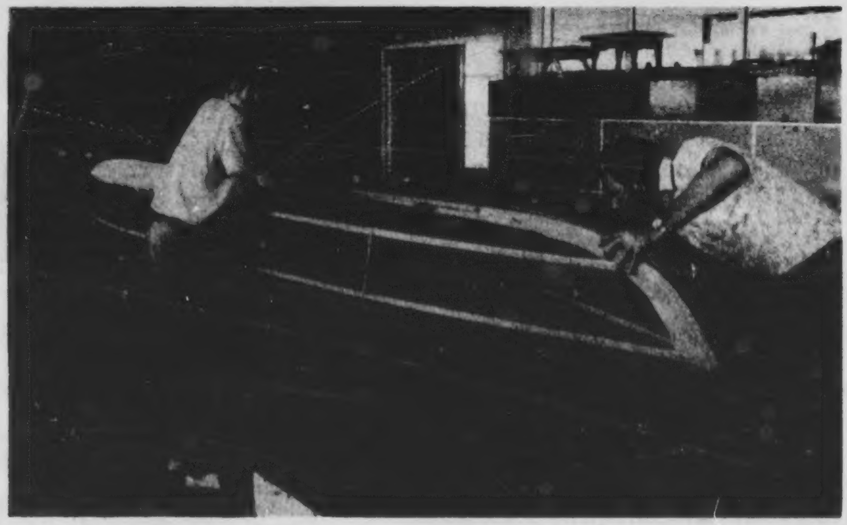
All this implies that the objective of development is not simply to increase national income, but to ensure that such increases lead to improvements in the standards of living of the vast numbers of people at the bottom of the income-distribution pyramid. It also implies that progress cannot be measured merely in terms of economic growth rates; it must satisfy other important indicators; more significantly, levels of employment, levels of nutrition, levels of housing, health and education, and so on. Employment must take its place along with GNP as a central object of concern in development planning and as an essential criterion of progress in development. A policy for economic growth is compatible with a policy for employment expansion provided that as much attention is devoted to the organization, methods and composition of production as is given to its volume.

It is in this setting that we must view the role of technical and vocational education and training as an instrument of social and economic change, and as an energizing force for the people of the region. More importantly, we must see the relevance of educational objectives, processes and outcomes to the socio-economic objectives of national development, and ensure the best possible congruence between them.

Policy formulation and planning

The first objective indicator is how a policy for technical and vocational education is formulated and a framework provided at the national level for planning the system in response to a country's current and future needs. This implies the government's role in directing the system as an integral part of national economic development.

In almost all countries of the region, governments have assumed direct responsibility for technical and vocational education and have



set up various mechanisms for its planning and implementation. In Bangladesh, India, Indonesia, Malaysia, Pakistan and Singapore, for example, National Planning Commissions or Economic Development Boards lay down broad guidelines in respect of each sector of activity, including technical and vocational education. This is designed to ensure co-ordination between the demand and supply of manpower.

The manpower demand-and-supply approach to planning is necessary, but is not an adequate substitute for a well-defined national policy formulation to spell out the goals and objectives of technical and vocational education. First, demand and supply data are a statistical, not a qualitative, assessment of the types of technical personnel needed, the knowledge, skills and competencies which they should possess, or other information which is required for rational planning. Second, a purely quantitative approach restricts the scope of the national effort to the expansion of an existing system. It does not designedly lead to the development of the system, nor to its diversification. Third, statistical techniques involved in manpower methodology are still imperfect and require extensive and refined data which in many of our countries is not readily available.

There is therefore increasing recognition of the need for a more comprehensive approach to policy formulation and planning for technical and vocational education. This is reflected in the special agencies set up in some countries. For instance, in India a Board of Technician Education has been set up to reorganize the polytechnic system following the recommendations of an inquiry committee. In the Philippines a new polytechnic system is being designed and developed with overall responsibility vested in the Philippines University of Technology (formerly, the Philippines College of Arts and Trades). Similarly, in Thailand, a new Department of the Institute of Technology and Vocational Education has been established under which all technical institutes have been brought for co-ordinated development. The Republic of Korea has embarked on a comprehensive reorganization of its system of technical institutes in line with the technological changes in the country's industry.

A comprehensive approach to planning also demands methodologies which are appropriate to our countries, particularly since the objectives of socio-economic development as outlined earlier must be realized through a dynamic system of technical and vocational education. Unfortunately, the much-needed expertise at the level of planning and administration is not adequate. It is to fill this gap that the Colombo Plan Staff College in Singapore, which is a co-operative enterprise of 27 member countries, has designed and conducted a series of in-service courses in technical education planning and management. So far over 300 directors of technical education, senior administrators and heads of technical institutions have participated in the courses.

The courses are structured around the identification of problems and issues in technical education planning and development and the establishment of methodological approaches to their resolution. In this process, participants cross-fertilize their ideas and experiences and collectively determine solution strategies appropriate to their developing countries. Further, they delineate planning processes from the goals and objectives of the system as determined by them. It is to be hoped that in the course of time, planning concepts and methodologies for technical and vocational education in countries of the region will acquire a correct national perspective.

Curriculum design and instructional resources

The second objective indicator is the viability of a technical and vocational education system; that is, the system's effectiveness and efficiency are its relevance to the socio-economic setting of the country concerned.

We must view relevance not in the abstract, but in terms of the competencies, such as knowledge, skills and attitudes, with which the system equips its human output. Employability or usefulness of these competencies in the productive processes of different economic sectors underscores the relevance of the system.

In many countries still, educational planners, administrators and even teachers have not expressed adequate concern for the relevance to the needs of industry of their technical and vocational education systems. As a result, industry and other employing agencies are critical of the systems and have pointed out that the present graduates of technical institutes are not equipped with the knowledge and skills useful to their organizations. There is, on the one hand, evidence of unemployment and under-employment of technical graduates and, on the other, critical shortages of suitably-trained personnel in many sectors of the national economies.

This anomalous situation has arisen because the objectives of technical courses are not clearly determined and spelt out to explain to teachers, students and prospective employers the various occupations for which the courses are designed; moreover, the course curricula do not specify the kind and level of competencies which need to be developed in students to achieve the objectives. By way of curriculum, institutions are only provided with a syllabus consisting of the topics to be taught in each subject, the amount of time allowed for each subject and a scheme of examinations. The syllabus is a wholly inadequate document to guide teachers, expecially in respect of the questions: what do we teach and why? how do we teach it? and how do we know when we have taught it?

In this situation teachers interpret the syllabus in their own way or at best are guided by past practice, with the result that students complete the courses offered, receive diplomas or certificates but do not know how and where they are fit to be employed.

It is therefore evident that the remedy to the situation is to promote an organized programme of curriculum design and development either at national or institution level. The process must necessarily start with activity analysis of technical personnel at work. It involves identification of all technical jobs in the different sectors of the national economy, analysis of the jobs to determine the competencies required, grouping the jobs on the basis of the knowledge and skills involved, and classifying the groups according to subject specialities. This is the basic data which will help us to establish the much-needed co-ordination between educational programmes and industry's manpower requirements.

The next stage is to spell out the general objectives of each course to indicate the competencies which the course will provide and the types of jobs for which the graduates of the course will be suitable.

Following this, subject experts should formulate specific objectives in behavioural terms for the different subjects to be included in each course and determine subject contents in both depth and breadth. Apiece with the curriculum, they should also lay down student evaluation procedures to fit the behavioural objectives.

It is not the intent of this article to dwell on the behavioural objectives approach to curriculum design, however, but to highlight the importance of and urgency for this activity to ensure the effectiveness of technical and vocational education systems. Several of the countries of the region have in recent years launched comprehensive curriculum design projects, particularly at the technician level - which is one of the critical manpower areas in industry. In India, for instance, the Regional Technical Teachers' Training Institutes have carried out technician activity analysis in major engineering fields and redesigned the curricula for diploma and post-diploma courses offered by polytechnics. They have also developed objective tests to evaluate student achievement. All this and more are making a significant impact on India's polytechnic education system. Singapore analysed its needs for the entire economy and changed its curricular emphasis drastically. Similarly, in Bangladesh, Indonesia, Pakistan, the Philippines and Thailand, curriculum design and development work has been initiated which in course of time will give new perspectives to technical education in those countries.

At this stage, one need not emphasize the importance of training teachers in curriculum design and development, and building up expertise in this area in the countries of the region. (Here again, the Colombo Plan Staff College has assisted toward this end by designing and conducting training courses for several hundred of those who are responsible for technician education systems. Its graduates are providing some much-needed expertise to curriculum development activity in their respective countries. In addition, it has prepared a modular programme in instructional design and delivery to equip serving technical teachers with competencies in this area, and has trained resource persons in countries of the region to implement the programme).

Curriculum design is one aspect of technical education improvement. The other and equally important aspect is the development of learning resources like text-books, student work-books, other printed and non-printed instructional materials, laboratory experimental kits and so on. There is a dearth of such resources in technical institutions in many countries of the region and the position is worse in those countries which because of foreign exchange and other difficulties are unable to import them from outside. Wherever the medium of instruction is the country's national language, imported materials written in English are of limited use. There is therefore no alternative but to produce the needed learning resource materials indigenously. In fact, some countries like Indonesia, the Republic of Korea and Thailand are making efforts to produce text-books and other learning materials in their own national languages and have achieved some measure of success. Much more remains to be done in almost all countries, however, and it is in this area that international organizations can make a significant contribution by way of building up expertise in individual countries.

Staff development

The heart of an education system is the teacher. This is particularly true in technical and vocational education since it is often the teacher who has to understand an economy's manpower needs, design the curriculum and implement it, evaluate the curriculum, get the feedback and make improvements on a continuing basis. We may therefore readily agree that the third objective indicator of the state of health of a country's technical and vocational education system is how teachers are trained and developed as an on-going process.

A variety of teacher training programmes are in operation in regional countries, but they are mainly for the pre-service training of teachers for vocational or secondary technical schools. The general pattern is a three-to-four year course following school education of nine or ten years, in which technical subjects, theory and practical, are integrated with pedagogy. The emphasis is on teaching trade-level subjects such as metal cutting, welding, automotive

mechanics, wood-work, building trades or electronics. These types of technical teacher training programmes have made significant progress in Indonesia, Malaysia, the Philippines, the Republic of Korea, Singapore and Thailand, where secondary technical or vocational schools constitute an important segment of the national systems.

The issue of staff development arises mainly in respect of technician institutions at the post-secondary level. In all countries of the region, technician education systems have been established or are in process of being established to produce middle-level technical personnel. The technician courses are three-four years in duration after secondary schooling and conducted in institutions which are called by different names in different countries; viz., polytechnics, technical institutes, institutes of technology, junior technical colleges. The content and standard of technician curricular offerings vary, and depend upon how the countries concerned have determined the objectives of the courses, their duration and the characteristics of the system within which they are planned and implemented. These differences notwithstanding, the broad curricular structure comprises:

Science, Mathematics and General Studies;
Technical Education (Theory and Practical);
Technology (Theory and Practical).

Technical Education (Theory) consists of engineering sciences - like applied mechanics, strength of materials and graphic statics - which, together with physics, chemistry, biology and mathematics provide the foundations for technology. Technical Education (Practical) consists of laboratory work associated with these subjects, engineering drawing, workshop practice, surveying, crop production and livestock breeding, and other forms of practical work. Technology (Theory) relates to the main fields of technician specialities, like civil engineering, mechanical engineering and electrical engineering, or to the sub-specialities in each main field, such as building-construction engineering, agricultural engineering, automotive engineering, electrical power plants, or production engineering. Technology (Practical) is the associated practical work; laboratory testing, crop and livestock testing, design drafting, or production shop processes for each technical speciality subject.

The proportions of these five components in the curricular offerings of different countries vary depending upon how each country has perceived technician functions within its own national setting. The engineering or higher technician courses generally tend to be broad-based, but sometimes a stem of specialization is offered as an elective. The industrial or trade technician courses are narrowly specialized mostly in craft or skill-oriented specialities.

It is to those persons to whose charge the technician education systems are committed that staff development must be addressed. The question is . who are the persons responsible for the system? from where are they recruited and what competencies do they possess? what should be the objectives of staff development and how should it be designed and conducted?

Teachers for teaching institutions are generally recruited from two main sources; first, from university graduates in engineering for senior positions of lecturer and above; and second, from technician diploma or certificate-holders for junior positions, like instructors. In hardly any country of the region is there an organized programme of training of these teachers to prepare them adequately for their duties and responsibilities in the institutions. A study of the present position made recently by the author has highlighted the following:

1. An over-emphasis on academic qualifications, such as degrees, has brought into the teaching profession a large number of persons with little or no industrial experience. As a result, much of the learning in technician institutions is theoretical, out of text-books, and lacks adequate practical content and application;

2. Since the present teachers have not been specifically prepared for technician education, they are unable to evolve teaching/learning strategies suitable to technician courses, to implement them in actual classroom situations, or to evaluate their own performance and find ways and means of improving the system;

3. The Technician courses handed to them by their institutions are only in the form of syllabuses or topic headings in each subject. In the absence of any training in curriculum design and development, they are unable to determine the precise objectives of their own subjects, plan and sequence lessons, devise suitable instructional methodologies, or evaluate the interaction of subject content, teaching methodology and course objectives through students' outcomes;

4. Due to a lack of industrial/practical experience, teachers are not sufficiently aware of industry's needs in respect of technicians and how to meet those needs through well-designed curricular offerings. They are also not sufficiently aware of the further-education needs of technicians;

5. Many teachers who are university graduates are required to teach in an environment different from that in which they studied; as

such, they are unable to adjust or adapt themselves to the environment in which technicians work.

These and other associated problems can only be resolved by staff development programmes. The objectives of staff development may therefore be broadly stated as below :

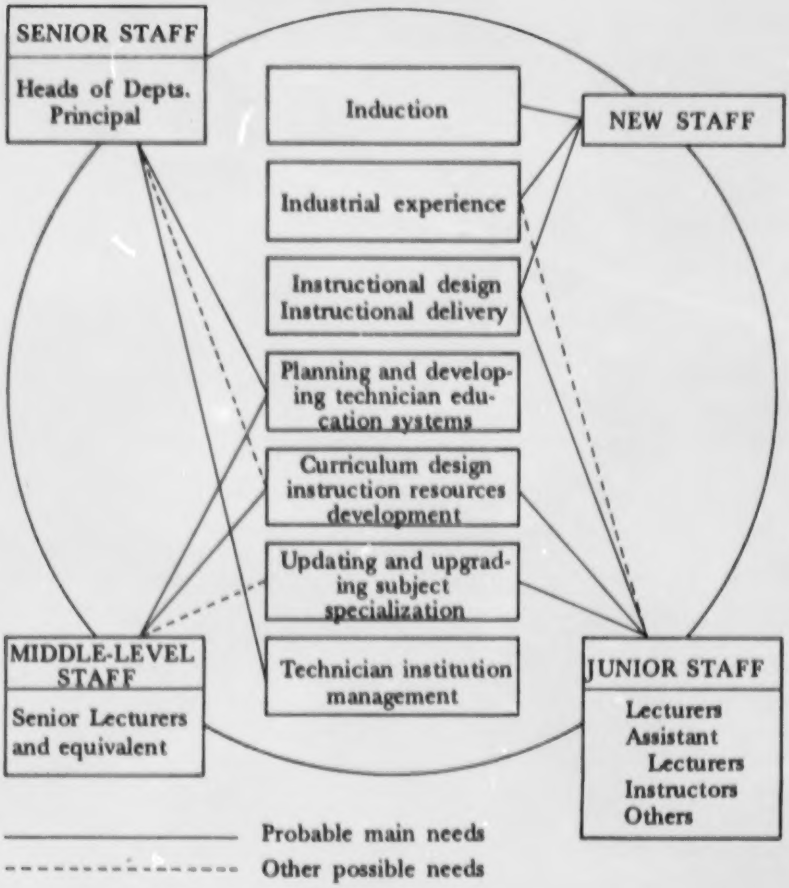
1. To adequately prepare recruits for the teaching profession in technician institutions ;
2. To improve current performance of working teachers and remedy existing weaknesses in teaching, including laboratory, workshop and other types of practical work;and to motivate them to use new methods and techniques by augmenting their knowledge and skills;
3. To equip teachers with understanding of industry's technician needs so that they may become effective agents for curriculum reforms and for promoting co-operation between technician institutions and industry;
4. To prepare teachers for their changing duties and responsibilities, especially when they rise to senior positions as heads of departments or principals and are required to give leadership to other teachers and perform management functions;
5. To prepare teachers for advancement in their own institutions or in their state education service;
6. To enhance teachers' job satisfaction;
7. To adapt both the institution and individuals to a constantly changing social and technological environment.

These broad objectives imply that staff development must be viewed both as an on-going process and as a multi-faceted programme to meet the needs of teachers at all levels within an institution. An illustrative staff development structure is represented in Figure 1.

There is growing recognition of the importance of staff development in countries of the region, both at government and at technician institution level, and several innovative programmes have been initiated. In India, for instance, the Technical Teachers' Institutes have designed competency-based courses specifically addressed to serving teachers at different levels. Over 80 competencies, around which programmes have been structured, have been identified by teachers themselves according to their present and future needs. The teachers follow up the courses with actual development work in their own institutions in such areas as curriculum design, instructional resources, testing and evaluation and innovations in laboratory

STAFF DEVELOPMENT IN TECHNICIAN EDUCATION

Main areas *vis-a-vis* staff needs


SENIOR STAFF
Heads of Depts. Principal
NEW STAFF
Induction
Industrial experience
Instructional design Instructional delivery
Planning and developing technician education systems
Curriculum design instruction resources development
Updating and upgrading subject specialization
Technician institution management
MIDDLE-LEVEL STAFF
Senior Lecturers and equivalent
JUNIOR STAFF
Lecturers
Assistant Lecturers
Instructors
Others
Probable main needs
Other possible needs

work. These competency-based programmes are in addition to full-fledged teacher training courses for teachers sponsored by their institutions. In Bangladesh, a national scheme to send polytechnic teachers to industry to gain practical experience has generated great enthusiasm among the teachers. In Indonesia three centres have been set up to upgrade vocational school teachers and equip them for a new system of technician education in the country. Thailand has set up a staff development centre at the King Mongkut Institute of Technology providing in-service training of teachers for the country's technical education system. In the Philippines, the new University of Technology (formerly the Philippine College of Arts and Trades) has taken the lead in organizing staff development programmes for technical institutions.

Co-operation between technical institutions and industry

The three objective indicators discussed so far will not alone give all the perspectives to a country's technical and vocational education system. The nature and scope of interaction between a technical institution and industry must also be viewed as a measure of the viability of the system. Thus, we may add technical institution-industry co-operation as the fourth objective indicator.

Among the many forms of co-operation, the way in which industry shares responsibility with institutions in the education and training of technicians is perhaps the most important in the context of the countries of the region. We have already viewed the paradox that in many of our countries large numbers of graduates of technician institutions are unemployed or under-employed while at the same time industry is experiencing critical shortages of technician manpower.

This situation has arisen mainly because we have yet to fully recognize this type of technician preparation, which is not just a course but a process which must take place partly in an institution and partly in industry (including agriculture). An objective analysis of technician functions demands that it be so. The business of a technical institute is to give prospective technicians a sound broad-based knowledge in the theory of their chosen field. With this they should be able to understand the basic principles of design, construction, production in all fields, testing and whatever else comes under their functional jurisdiction. The technician curriculum must develop knowledge and mould attitudes to the highest level of proficiency. This education must be cross-fertilized with practical experience in industry so that technician-trainees are familiar with working methods and skills relevant to their field.

To co-ordinate theory with practice, to relate technical knowledge with work in industry and to elaborate the complementary functions of technical institutes and industry: all these form the heart of the problem of technician education. Initiative must be taken by our national governments to bring institutions and industry together to design and conduct co-operative courses as their joint responsibility. Governments must back up the effort by introducing, wherever necessary, apprenticeship legislation at technician level.

The Indian situation is a case in point. When the polytechnic system expanded on an extensive scale during the second and third

Five-Year Plan periods (1955-1965), the gap between industry's technician manpower needs and what the polytechnics could offer widened. Industry complained that the polytechnic diploma-holders were not equipped with the knowledge and skills needed. The Indian Government then brought industry and polytechnics together to discuss mutual problems and devise ways of establishing co-operation for technician education and training. Thus a new perspective was added to the country's technical education system. In several states, industry took the lead by establishing polytechnics exclusively for sandwich and co-operative courses. Further, the Indian Government amended the Apprentice Act of 1961, which was restricted to craft or trade apprentices, and enlarged its scope to include technician and engineer apprentices.

It would be naive to suggest that government action or legislative measures alone will transform industry and technical institutions into a co-operative relationship. Unless there is a meeting of the minds and interests of those who are in charge of industrial enterprises and those who are responsible for educational systems, the barriers will continue. This is precisely where staff development of technical teachers, especially in respect of their industrial experience, is a crucial factor. Likewise, technical institutions must endeavour to involve persons from industry in revitalizing their educational effort. The establishment of Industrial Liaison Boards, comprising representatives of industry and technical institutions, is an important step in this direction.

We should also recognize that industrial development is not evenly spread out in the different areas of countries and that many technical institutions function far from an industrial environment. The problem here is how to create an industrial atmosphere for these institutions.

The lead must necessarily be taken by the institutions themselves depending upon their resources and the inventiveness of teachers. They could make their workshops, laboratories, agricultural areas and other facilities production-oriented for the small-scale manufacture of goods and services needed by the community. Both teachers and students could thus bridge the gap between the act of learning and the context of action. Where possible, institutions with the assistance of appropriate government agencies, like small-industry development organizations and farmers' co-operatives, could set up production units which will be both a source of income to the institutions and a rewarding experience to students and teachers. In India, several polytechnics, notably the Allahabad Polytechnic, have successfully demonstrated possibilities in this direction. In China, it is apparently usual for technical institutions to run their own industrial units such as machine-tool manufacturing, foundries and forges, and electrical installations and machines.

The point to emphasize is that the problems of technical and vocational education in our countries are unique in many respects and we should resolve them by adopting innovative approaches within the constraints of our national contexts, not by blindly copying models from industrially-advanced countries. Only then can we ensure that our national systems have their own integrity and vitality to meet future challenges.

We reprint below the Recommendations of the Regional Seminar on Technical and Vocational Education in Asia and Oceania held in Singapore from 20 to 27 November 1979. These Recommendations provide a framework for action at the national and regional levels in support of reforms in technical and vocational education.

RECOMMENDATIONS

Introduction

In addition to the suggestions made at the plenary and group discussions, the Seminar considered the Revised Recommendation concerning Technical and Vocational Education adopted by the General Conference of Unesco at its 18th Session (1974), and the relevant recommendations of the Fourth Regional Conference of Ministers of Education and Those Responsible for Economic Planning in Asia and Oceania.[1]

The Seminar discussed the issues related to productive work as part of the learning process, and technical and vocational education in relation to rural development. It decided to make a series of recommendations for consideration by governments or educational agencies, and urged that priority be given to this approach to technical and vocational education.

The Seminar also discussed continuing education, and the appropriateness of formal and non-formal methods of learning. These points were taken into account when the following suggestions were being prepared, with the intention that many of these apply to relevant aspects of continuing education.

NATIONAL LEVEL

I. Productive work

A. Curriculum design, development and evaluation related to productive work

In these processes, the Seminar recommends that consideration be given to:

1. a) the proportion of time to be spent on productive work throughout each course;
   b) the proportion of time given at each level of technical and vocational education;

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[1] Fourth Regional Conference of Ministers of Education and Those Responsible for Economic Planning in Asia and Oceania, Colombo, 24 July–1 August 1978. *Final report.* Paris, Unesco, 1978. p. 14-17.

c) the ways in which productive work is most appropriately undertaken:
  - i) in the sandwich mode;
  - ii) after the theoretical studies have been completed;
  - iii) concurrently with theoretical studies, such as part-time study and part-time work;

d) which aspects of the several objectives should be given priority at each stage of technical and vocational education;

e) whether simulated work places or actual, real-life work places are more appropriate, specifically the placement of the productive work and whether it is best undertaken in:
  - i) the educational institution's own training facility or workshop;
  - ii) a special production unit or centre attached to the school;
  - iii) an on-the-job site, in industry;*
  - iv) in a training centre attached to industry.

2. The appointment of officials to co-operate with, and to co-ordinate the activities of the teaching institutions and the industries and services, in order to:
   - a) work out with industries or services the nature of the productive work experience required by the learners;
   - b) explain to the teaching institutions the nature of the curriculum most required by the learners to fit them for work in the industries or services;
   - c) assess the effectiveness of the productive work experience;
   - d) provide vocational guidance to learners.
3. Providing equal access in all areas of technical and vocational education to boys and girls, men and women.
4. Providing special opportunities for those who are disadvantaged, such as those handicapped by poverty or physical problems.
5. The need to give priority to the educational objectives of technical and vocational education programmes (that is, to contribute effectively to the learning process) rather than to allow the production outcome to be of greater importance.
6. The desirability, within the process of curriculum design and implementation, of including:

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* When the term 'industry' is used, it is meant to apply to agriculture and other appropriate operations and services, as well as to modern-sector activities of manufacturing and urban services.

a) surveys of manpower needs to determine necessary priorities in implementing courses and associated productive work programmes;

b) task analyses of jobs in industries so that courses may be designed in terms of appropriate behavioural objectives and the correct productive work experience be provided;

c) analyses of the learners' productive work experience to assist further reinforcement of learning in the institution.

7. The incorporation of productive work as an integral and essential component of the curriculum by involving the following design actions:

   a) task analyses of productive work jobs for matching with the competencies developed in institutional training, and specification of behavioural objectives for systematic curriculum development for the institutional programme;

   b) surveys of the community for location of service needs and subsequent task analyses of these;

   c) placement of the productive work experience in the total learning sequence planned for the learner to ensure the most effective reinforcement and new learning;

   d) analyses of the experiences of the learner in productive work for further reinforcement of learning in the institution.

8. The incorporation of productive work experiences early in school education and its continuation, with greater emphasis and sophistication, into technical and vocational education.

9. Flexible design of the curriculum in order to allow for productive work to be completed either on the job or in a school situation.

10. Decentralizing, to the local level, decision-making about the curriculum in order to facilitate the implementation of both productive work and course work.

11. The use of local resources and materials in curriculum development.

12. The inclusion in the curriculum documents of:

    a) the relationship of productive work objectives to the course objectives;

    b) recommended teaching sequences necessary to link productive work to theory;

    c) methods of assessment of the productive work for in-course and terminal purposes;

    d) the proportion of overall assessment to be awarded to productive work.

13. The degree of importance to be given to such factors as cost effectiveness, entrepreneurial skills and marketing.
14. Methods of evaluating productive work in the curriculum, including the:
    a) relevance of productive work to the overall curriculum;
    b) problems of implementation of productive work;
    c) problems of procurement of resources, and problems concerned with finished products.

B. Staff development for productive work

In this connection, the Seminar recommends that consideration should be given to:

1. The policy decisions that should be made and carried out about the recruitment and development of staff.
2. The importance of recruiting staff who are experienced and able in productive work.
3. Policy decisions about the proper and necessary status of teachers. (Note: policy statements should acknowledge that a skilled educational staff is as important a resource as are facilities and finance in the provision of technical and vocational education. Steps should be taken to accord technical and vocational education staff the status which matches the importance of their contribution to social and economic development. Specifically they should be paid salaries and employed under terms of service which are at least as attractive as those they would obtain in industry).
4. Given present difficulties in recruiting people, the design of staff development programmes and their high priority to support the successful introduction and maintenance of productive work in technical and vocational education programmes.
5. Preparing staff development programmes for all personnel engaged in productive work programmes—including policy-makers, teachers, instructors, administrators and clerical staff, industry liaison officers and personnel in industries.
6. The inclusion within pre- and in-service staff training programmes, of courses and activities which foster positive attitudes toward productive work and which enhance skills in planning and managing productive work programmes. The trained staff, may thereby become agents of curriculum reform capable of integrating productive work with technical and vocational education programmes and

administrating such programmes, particularly with regard to facilitating the liaison and interface with industry.

7. Staff development programmes which include the requirement that personnel undertake and be given appropriate recognition for such activities as:
   a) pre-training industrial experience or,
   b) periods of 'return to industry' after the pre-training course so that the teacher may both bring existing skills up to date and learn new ones.
8. Allocating priority to staff development programmes for skills necessary to carry out productive work.
9. Designing staff development programmes which produce teachers competent in the skills required for productive work, together with the necessary theory and attitudes.
10. The design and implementation of staff development programmes which can be carried out by staff at the local level (including enhancing the competence of local staff to allow this to be done).

C. Development of learning resources for productive work

In this context, the Seminar recommends that consideration be given to:

1. The development of materials directed to a variety of groups (teachers, instructors, administrators and clerical people, students, and personnel engaged in industry–employers, union members, and the self-employed).
2. Materials which would explain-
   a) the aims and objectives of productive work;
   b) the importance of productive work in technical and vocational education courses;
   c) the complementary roles of each group–their rights and responsibilities;
   d) the types of productive work which are most suitable.
3. The development of guidelines for both the learners and the industries, which:
   a) indicate the details of the curriculum which the learners are undertaking;
   b) indicate the types of productive work they should have;
   c) record what productive work each learner has undertaken.

4. The development of worksheets for productive work which may consist of:
    a) the objectives of the productive work experience;
    b) the necessary pre-requisite theory;
    c) the materials required;
    d) the methods of production.

D. Planning and organization for productive work

The Seminar recommends that consideration be given to:

1. The determination of policies which should be made at each appropriate level affirming the importance of productive work programmes as a necessary component of technical and vocational education.
2. The establishment of effective national support structures to coordinate activities among a number of agencies.
3. The establishment of productive work committees, comprising members from industries and the community, at appropriate levels—particularly the local level—to:
    a) advise the technical and vocational education authorities on the needs for, the provision of, and the effectiveness of such programmes;
    b) assist with the liaison and interface between the educational institution and industries;
    c) provide assurance of relevance of the programmes to changing demands.
4. Appropriate legislation and legal offices for such arrangements as learner stipends, insurance and agreements with employers;
5. Official inspection systems which might be applied to the implementation plan to ensure that there is co-operation between the institutions and the industries.
6. The adjustment of class scheduling in technical and vocational education programmes to facilitate the inclusion of productive work.

E. Research and development for productive work

In regard to this area, the Seminar recommends that consideration be given to:

1. Action-oriented research and development programmes which might be initiated to investigate the effectiveness of curriculum development programmes, specifically:

a) the existing research literature to be analysed, synthesized and disseminated;
b) case studies and longitudinal studies of curriculum development programmes and their effectiveness within the geographical area.

2. Action-oriented curriculum research and development programmes which might be initiated in co-operation with staff development programmes, specifically:

a) the existing research literature might be searched, synthesized and disseminated;
b) case studies and longitudinal studies of staff development programmes within the geographical area.

3. The establishment, by each country, of a National Technical and Vocational Education Clearing House, which will co-operate with a Regional Clearing House. The clearing house service is an urgent need in all countries in the region, to prevent wasteful duplication of efforts, and to facilitate immediate supply of resources.

4. Determining the functions and operations of such clearing houses, which could have as their primary mission the collection and dissemination of all available information about productive work programmes within the Member States, specifically:

a) research and development activities;
b) course design and implementation activities;
c) staff development activities;
d) learning resources development and production;
e) planning and organization of programmes;
f) provision of and utilization of resources;
g) statistics including cost data and other information.

5. The range of items to be included, such as descriptions of research studies; descriptions of successful programmes (lists of objectives, descriptions of learning resource materials, examples of learner record cards); accounts of effective procedures (liaison between institutions and industries); and location of people with particular expertise who may be consulted. (Selection of items should be governed by their validity and usability to the potential users).

6. How the retrieval system could be kept simple and readily available to practitioners and administrators in the field.

7. The method of operation of such clearing houses, specifically:

a) a regular contribution of items to the clearing house headquarters;

b) a standard format for listing items, such as:
  - title of the item;
  - classification and code;
  - grade level;
  - brief description of the information, materials and activities;
  - location—name and address of the source.

c) a printed booklet or loose-leaf sheets which list the existing items and are regularly added to, on a quarterly basis;

d) the likelihood that the clearing house would cover topics other than 'productive work'; for example, *rural technical and vocational education, teacher education* and the like. (It would be necessary to use a coding system which could be expanded as required).

8. The allocation of funds for the purpose of establishing the clearing houses.

II. Technical and vocational education in rural areas

The Seminar recognized that the issues raised concerning productive work as part of the learning process had a special relevance to the expansion of technical and vocational education in rural areas. For this reason, a separate section was set aside for some recommendations.

The Seminar had an opportunity to discuss only a few of the major issues relating to technical and vocational education in rural areas, and has been able to make only a few recommendations. Participants felt that discussion at much greater depth is necessary. It is declared, therefore, that more seminars are needed specifically to discuss and make recommendations on this matter.

A. Curriculum

In this connection the Seminar recommends that consideration be given to:

1. The value of relating the curriculum to the needs of the community.
2. The flexibility of curriculum design, to allow for regional differences in rural areas to suit local needs (possibly leading to a modular approach).
3. Basing the curriculum upon a survey of the area where it is to be taught, learned and used.
4. Emphasis upon entrepreneurial skills.

5. Basing the design of the curriculum on current and emerging patterns of development, and providing for new skills which will diversify employment, including self-employment opportunities.

B. Development of staff

For this area, the Seminar recommends that consideration be given to:

1. Staff development programmes which emphasize entrepreneurial skills.
2. Programmes which aim to improve the skills and attitudes necessary for rural development.
3. Programmes which aim to provide teachers with the necessary skills and attitudes to develop curriculum and learning resources for rural areas.
4. Programmes designed to allow staff to become involved in community activities.
5. Including in teacher training programmes, optional components which develop skills and attitudes appropriate for technical and vocational education in rural areas.
6. The use of local expertise and resources, wherever practicable, in the conduct of staff development programmes.

C. Learning resources development

In relation to these the Seminar recommends that consideration be given to:

1. The establishment of central workshops for the development of resource materials related to rural areas.
2. The involvement of the local community in the production of resources.
3. The development of resources which facilitate distance learning (e.g. radio, TV, self-instructional materials).
4. The development of resources at the appropriate level of sophistication and cost-effectiveness.

D. Planning and organization

In this context the Seminar recommends that consideration be given to:

1. Policy decisions being made at each appropriate level which affirm the importance of special technical and education programmes for rural areas.
2. Rural area committees comprising of educational and local members being established to:

a) advise the technical and vocational education authorities on the needs for the provision, and the effectiveness, of such programmes;
b) assist with the liaison and interface between the educational institution and industry;
c) ensure recognition and acceptance.

E. Research and development for rural areas

In this connection the Seminar recommends that consideration be given to:

1. The development of techniques to evaluate the needs of rural areas in order that relevant curriculum be designed.
2. The development of special modules for teacher training for rural areas.

REGIONAL LEVEL

The primary objective of inter-country co-operation at the regional level will be to contribute to the enhancement of the capacity of each Member State to develop an appropriate technical and vocational education system suited to its needs and conditions, in particular with respect to integrating productive work in the system and contributing to rural development.

Unesco, the Colombo Plan Staff College, and other organizations and institutions that have regional coverage, have important work to do in enhancing these national capacities. In addition to direct support to national-level actions, activities such as the following may be taken account of when Unesco and other organizations plan their regional programmes related to technical and vocational education:

1. Action-oriented studies, such as those which investigate:
   - the existing role of productive work, such as income-generating activities, work experience and socially useful activities in relation to educational content, paying attention to different sociocultural milieux, and to needs in human resources development at different stages of development;
   - alternative strategies aimed at making educational content, structures and teaching methods at the different levels relevant to social, cultural and economic development needs;
   - the occupational preferences and employability of secondary school leavers.

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2. Policy-oriented studies such as those which investigate:
   - necessary changes in curricula, methods and other relevant aspects of the educational system in order to develop attitudes, skill and knowledge in their graduates that are conducive to their employment;
   - ways and means of assisting graduates in their efforts to obtain employment for themselves.
3. Exchange of experiences and personnel among the countries in regard to innovative developments in technical and vocational education—and in particular integration of productive work in technical and vocational education—and contributions to rural development, such as through:
   - regional and sub-regional meetings;
   - study tours.
4. Inter-country transfer of expertise through means such as:
   - regional and sub-regional training programmes including those specifically for curriculum development and staff training;
   - mobile teams for in-country training courses;
   - placement and attachment programmes in which staff from one country are attached as fellow workers to relevant projects in another country for on-the-job training.
5. Co-operative research on problems of common concern among two or more countries, particularly those related to costs, curriculum design and development, and human resources development aspects.
6. At the request of Member States, assist in carrying out joint appraisal studies of the problems in the country relating to the development of technical and vocational education.
7. Establishing a Regional Technical and Vocational Education Clearing House in Asia and Oceania (RETVECH/AO) for the exchange of information and documentation, at the most appropriate place for the effective functioning of the Clearing House; i.e. in close association with curriculum design and development programmes and staff development programmes at a regional level. Further, in the manner that Unesco has assisted Member States in establishing a national system for scientific information, similar assistance should be provided for a national information system for technical and vocational education. Considering the urgency for interchange of information, documentation services may be initiated immediately

through existing regional agencies. The National Technical and Vocational Education Clearing Houses should be 'networked' into the Regional Clearing House Service. Member States will retrieve information from the Regional Service, and will have responsibility to contribute to the Regional Service on a regular basis.

8. In support of the above activities, establishing a Panel of Experts from the Member States in the Region, to monitor and review periodically the progress of technical and vocational education in the Region, and advise on emerging aspects of regional co-operation and regional action.*

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* At the final plenary session, the Seminar adopted a resolution emphasizing the importance of a regional clearing house service and the establishment of a panel of experts.

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The **COLOMBO PLAN STAFF COLLEGE FOR TECHNICIAN EDUCATION, Singapore**, was established in 1974 as a joint, co-operative enterprise of 27 member countries. Among other activities, the College provides courses for the further professional education and training of key personnel in technician education, conducts study conferences, assists countries of the region in curriculum development and promotes and co-ordinates research in technician education and teacher training.

Mr. **D. J. VICKERY** was for a number of years Principal Architect in the Unesco Regional Office for Education in Asia and Oceania. Upon completion of his architectural studies Mr. Vickery trained as a technical teacher at Huddersfield Technical Teachers' Training College, England. After ten years of teaching in technical colleges, he joined Unesco in 1962 as senior expert in the Asian Regional Institute for School Building Research, a Unesco-sponsored institution. He is the author of a number of publications dealing with educational building design, including the design of workshops.

Dr. **L. S. CHANDRAKANT** has recently retired from the position of Director of the Colombo Plan Staff College, Singapore. Prior to that appointment he served as Additional Secretary of the Ministry of Education and Culture, Government of India.

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BIBLIOGRAPHY
ON
TECHNICAL AND VOCATIONAL EDUCATION
INCLUDING
PROGRAMMES LINKING EDUCATION AND PRODUCTIVE WORK

This bibliography is a selection of titles from holdings and reference lists in the library of the Unesco Regional Office for Education in Asia and Oceania, Bangkok, supplemented by some holdings of the Library of the Colombo Plan Staff College for Technician Education, Singapore.*

The Educational Documentation and Information Service (EDIS) of the Unesco Regional Office for Education in Asia and Oceania will appreciate being notified of documents of Asia and Oceania on and related to technical and vocational education in the region published within the last five years which are not included in the bibliography. Better still, readers may wish to send the actual documents to Unesco EDIS, Bangkok.

GENERAL AND ASIA/OCEANIA

APEID Joint Operational Study of On-Going Pilot.Projects in Education in Asia: Bangladesh, India, Sri Lanka and Thailand, 16 October-16 November 1977. *Work and learning; final report.* Bangkok, Unesco, 1978. 70, vi p. (Asian Programme of Educational Innovation for Development)

This study includes reports on projects in Bangladesh, India, Sri Lanka and Thailand which are attempting to link learning activities with the realities of life with specific regard to problems and needs of the community.

/APEID/ Planning Group Meeting on Non-Formal and Alternative Structures in Education with Emphasis on Development of Productive Skills, Bangkok, 18-27 September 1978. *Review of non-formal programmes and structures and guidelines for organizing national and sub-regional workshops.* Bangkok, Unesco, 1978. 60 p. (Asian Programme of Educational Innovation for Development)

The Meeting was the third of a series of five phases under the APEID programme area of Non-Formal and Alternative Structures in Education.

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* The asterisks mark titles and annotations as adapted from: Colombo Plan Staff College for Technician Education, Singapore. *Background and thematic papers of the Staff College, an annotated list,* compiled by Siew Gek Kheng. Singapore, 1979. 60 + 17 p. (includes April-October 1979 supplement). The Staff College library call-number follows each entry and should be quoted in any inquiry. Except for a few entries, this bibliography is based mainly on titles published within the last five years.

The five phases are: (1) Joint operational study of pilot projects in education relating work and learning; (2) Inter-country, inter-project study visits; (3) Planning group meetings; (4) National workshops; (5) Sub-regional training workshops. Highlighted in this review are projects in education which relate work and learning or aim to develop productive skills and self-reliance in the people. Guidelines and work plans for holding national workshops, as developed by the Planning Group, are given in the last two chapters of the review. The projects take place in Bangladesh, Indonesia, the Philippines, the Republic of Korea and Thailand.

APEID Sub-Regional Workshop on Non-Formal and Alternative Structures in Education with Emphasis on Development of Productive Skills, Philippines, 28 May-16 June 1979. *Development of productive skills; report.* Bangkok, Unesco, 1979. 68 p. (Asian Programme of Educational Innovation for Development)

The purpose of this workshop was to help the participants make a study of non-formal education programmes combining work and learning, examine their strengths and weaknesses, and discuss problems and constraints. The participants were also provided with opportunities to develop skills critical to the design, development and renewal of such programmes. Recommendations were made to facilitate skills development in non-formal education.

[APEID] Technical Working Group Meeting for Developing of Guidelines for Curriculum Development and Instructional Materials Design in Vocational and Technical Education with Focus on Mechanical and Civil/Building Subjects, Seoul, Republic of Korea, 15-27 October 1979. *[Report]* and country papers. Bangkok, 1979. 1 v. (various paging) (Final report in preparation)

The participating countries reviewed their experiences in innovative projects involving strategies and methodologies in curriculum planning and designing of instructional materials in both formal and non-formal education programmes. Problems and issues were discussed to find strategies to overcome difficulties.

ASPBAE Region 3 Conference, 9-15 September 1979, Republic of Korea. *Adult education in industrial and urban community, proceedings*, ed. by Jong-gon Hwang. Daegu, Institute for Community Education, Keimyung University, 1979. 235 p.

Eleven countries from the region of Asia and the Pacific were represented at this Conference. The country papers and discussions dwelt upon the impact of urbanization and industrialization on adult education and were concerned with the education of underprivileged groups such as workers, out-of-school youth, women and senior citizens. The participants showed deep interest in education programmes in the Republic of Korea which embraced religious, moral and civic education as well as work-related skills. The view was expressed that it is essential to co-operate and work with industrial and other work-oriented companies and concerns, if adult education is to be relevant and effective in urban industrial settings.

*Bari, M.A. *Education and training systems for technicians.* [d377.5/Bar]

The writer discusses the components, characteristics and problems of technician education and training systems.

*______. *The practice of curriculum evaluation.* [d371.214.001.4/Bar]

This paper tries to identify and delineate the tasks involved in the evaluation process, and also suggests an organizational set-up for

planning, co-ordinating, guiding and completing the various tasks involved in the curriculum evaluation process. Some current issues in curriculum evaluation in regional countries are presented and some information collection instruments have also been included as samples.

*Bari, M.A. *Production and selection of print resources.* /d371.67/Bar/

The paper discusses the features of different resource materials that can be prepared and used in regional countries and deals with issues like:

1. Is development of learning resource materials worthwhile?
2. Who should develop the learning resources?
3. At what level should the materials be developed?
4. Some current problems in the production and utilization of resource materials in the regional countries.

*______. *Student selection and placement in institution and industry.* /d377.18/Bar/

The entrance requirements to technician training and the selection mechanisms must be related to the appropriate kind and level of technician training and employment. The mechanisms must measure applicants against the tasks they will have to perform and not against the criteria of the education system that produces them.

*Basu, C.K. *Introduction to writing instructional objectives.* /d371.2.017/Bas/

This paper is intended as an introduction to writing objectives for curriculum design and development. It emphasizes the need for bringing precision into writing objectives, and highlights the role of objectives in designing a teaching-learning strategy as well as for testing and evaluating learning outcomes. The usefulness of the *Taxonomy of Educational objectives* for writing objectives is brought out. A technique of preparing a Table of Specification as a planning tool has been presented.

*______. *Item banking in technician education.* /d371.27/Bas/

This paper attempts to explain the concept of the item bank and how it might work in a technician institution.

*______. *Measurement and testing in teaching-learning process.* /d371.26/Bas/

The focus in this paper is on the measurement of learning outcomes and some approaches in developing tools and instruments for measuring student achievement.

*______. *Programmed learning and effective instruction.* /d371.315.7/Bas/

The paper discusses the principles of learning relevant to programmed learning, the basic characteristics of programmed learning and the preparation of programmed material. Two appendices are included. Appendix 1 gives a flow chart and the steps to follow in designing programmed instructional material. Appendix 2 is a short linear programme on causes of accidents.

*______. *Staff development in technician institutions.* /d377.114/Bas/

The objective of this paper is to identify possible strategies for organizing staff development programmes.

*Basu, C.K. *Teacher development for curriculum implementation.* [d377.112.4/Bas]

The author outlines the major strategies for teacher development for the successful implementation of a curriculum which is either newly developed or substantially modified from an older one.

*Chandrakant, L.S. *Apprenticeship: an analytic study of contemporary developments of education in industry.* [d331.86/Cha]

The aim of this paper is to examine all aspects of apprenticeship as a system of education within industry and to bring into focus its present and future role in the economy of developing countries.

*______. *Current issues in technician education in developing countries.* (Paper presented at the 'International Conference on the Education and Training of Engineers and Technicians' conducted by Unesco, Paris, from 20-26 April 1976 in New Delhi) [d377.5/Cha]

The author discusses the various issues concerning technician education in developing countries. These suggest that each country should plan its own technician education system best suited to its needs and design appropriate courses within that system.

*______. *Education and training of technicians.* [d377.5/Cha]

An analysis of conceptual issues involved in developing a coherent system of education and training.

*______. *Methodological approaches to planning and designing technician education systems.* [d377.014.542/Cha]

The first part of the paper discusses the topic of each country planning the technician education system best suited to its needs and designing appropriate courses within the system. The second part deals with the methodologies of planning and designing.

*______. *A systematic view of behaviour of technical institutions as organizations.* [d377.1/Cha]

The purpose of this paper is to examine the behaviour of technical institutions in the light of some of the important tenets of classical and neo-classical organizational theories. It thus provides an approach to those who wish to pursue a more critical and comprehensive understanding of how and why educational institutions behave as they do, and advance new theories. A detailed framework or working tool is given separately as a supplement.

*______. *A systems view of technician education and training and analysis of current issues.* [d377.5/Cha]

All major issues in technician development are integral to five basic elements; namely, purpose, people, structure, techniques and information.

*______. *Technical education and training.* [d377.031/Cha]

An analysis of major issues involved in planning and implementation, and an identification of the main areas of research and innovation.

*______. *Technician education and training systems in the Colombo Plan countries: a comparative study and analysis of current issues.* [d377.012.5/Cha]

This study presents an analysis of technical education and training systems in the Colombo Plan countries, with particular reference to the education and training of technicians. Defining technicians as "covering a broad spectrum, a middle-level manpower group responsible for a wide range of functions", the study covers all forms of education and training which are relevant to this group.

*Chandrakant, L.S. *Technician education and training systems in the Colombo Plan countries: a graphic presentation.* [d377.5(54+59)/Cha]

In this graphic presentation, all national systems which are designed to produce the technician manpower group within their own country settings are included. Vocational education and training existing as a well-organized form of manpower development is also added, since in many countries industry regards this as an important source of technical manpower at or near technician level.

*Chantrill, David. *Role of the technician: employment needs and prospects.* [d62.007.2/Cha]

The author attempts to broadly define a technician, and identify his duties and the attributes he should possess. Evidence of the growth in demand for middle-level manpower is presented, and the role of this group in the economic development of a nation is examined. The question of the status of technician manpower is considered along with suggestions for its improvement in society.

Colloquium on Intra-Regional Technician Training, 1965- *Reports.* Colombo, Colombo Plan Bureau, 1965-

Regional colloquia are held from time to time to provide a forum for an exchange of views on problems relating to the training of technicians, and to discuss possible solutions. The first colloquium was held in India, followed by colloquia in Thailand in 1967, Singapore in 1969, Philippines in 1971, and Pakistan in 1973.

Colombo Plan Staff College for Technician Education Newsletter (Quarterly) Singapore 9124, P.O. Box 187, Tanglin Post Office, 1974-

Colombo Plan Staff College for Technician Education, Singapore. *Background and thematic papers of the Staff College, an annotated list,* compiled by Siew Gek Kheng. Singapore, 1979. 60 + 17 p. (includes April-October 1979 supplement)

Combining education and work; experiences in Asia and Oceania: Australia, Bangladesh, Burma, India, Malaysia, Nepal, New Zealand, Pakistan, Philippines, Singapore, Thailand, USSR and Viet Nam. Bangkok, Unesco Regional Office for Education in Asia and Oceania, 1978. 1 set (13 booklets)

These country studies cover a wide spectrum of experiences, ranging from experimental projects to comprehensive, system-wide programmes in an attempt to make education functional and relevant to the needs of the individual and society.

**Comparative study of technician education and training systems.* [d377.012.5/Com]

The guidelines in this paper attempt to assist those who are interested in making a comparative study of technician education and training systems.

Developments in technical and vocational education: a comparative study. Paris, Unesco, 1979. 143 p. *(Unesco. Trends and issues in technical and vocational education)*

Countries which undertake to adapt their system of education to the needs of their economic and social development attach an important role to technical and vocational education, as revealed in this study which was originally based on reports presented by participants of 23 countries in Asia, Africa and Latin America taking part in an international conference organized by the U.S. Office of Education in collaboration with Unesco and the Inter-American Development Bank, and held in Denver, U.S.A. in June 1976. Their objective was to carry out the *Revised recommendations concerning technical and vocational education* adopted by the General Conference of Unesco in 1974.

The Denver conference points out the need for more specific information on technical and vocational education. In particular, the countries are interested in current reforms and in innovation.

The various chapters deal with the organigrammes of educational systems; politics, planning and administration; the three phases of technical and vocational education (general training, as preparation for a profession, and for lifelong education); methods of work; and development problems and innovative tendencies.

"Education and work", *Educational Documentation and Information: Bulletin of the International Bureau of Education* 52(207):1-92, 2nd quarter 1978.

Unesco's programme for 1979-80 in the field of education stresses, among other things, the need to "strengthen links between education and working life, particularly through the introduction of productive work into the educational process." Thus, the twentieth session of the General Conference of Unesco (October-November 1978) adopted "the interaction between education and productive work" as the theme for the thirty-eighth session of the International Conference on Education (ICE) to be held in Geneva in 1981. Taking these two elements into account, this edition of *Educational documentation and information* includes some important documents and an annotated bibliography on this subject.

The fourth Regional Conference of Ministers of Education and Those Responsible for Economic Planning in Asia and Oceania, which was organized by Unesco and took place in Colombo from 24 July to 1 August 1978, adopted a series of recommendations concerning the establishment of links between education and productive work. Apart from the recommendations which will assist Unesco and its Member States in directing their activities, this bulletin reproduces relevant passages from the working document serving as a bases for the discussions, as well as the report of Commission II at the Colombo Conference which was specifically required to study this question. Recommendation No. 68, adopted at the thirty-fourth session of the ICE (Geneva, 1973), concerning "the relationship between education, training and employment with particular reference to secondary education, its aims, structure and content" has also been reproduced.

"Elements of a dossier: secondary education, training and employment", *Prospects: Quarterly Review of Education* III(3):326-382, Autumn 1973.

The theme of the 1973 International Conference on Education was the inter-relationship between education, training and employment. The problem raised here for educators is to find ways to bring education and training into a closer and more meaningful relationship with the world of work.

FAO, Unesco, ILO. *Training for agriculture and rural development, 1977.* Rome, FAO, 1977. 122 p.

The growing evolution of non-formal education and training, extension, distance learning and other extra-mural activities reflected by articles in this issue indicate an insistent and widespread need for the direct participation of farmers, landless workers, foresters and fishermen in rural education and the training system.

*Gailer, John W. "Some aspects of technician education", in Colombo Plan Colloquium on Intra-Regional Technician Training, 4th, Manila, 1971. *Report.* p. 56-62. [d377.5/Gail]

The author comments on a number of factors which are important to the development of technician education; namely, the provision of adequate numbers of properly-trained administrative, teaching and ancillary staff and specifically planned physical teaching facilities.

*Gailer, John W. and M.A. Plint. "The training of the engineering technician - a neglected step in the educational ladder", in Colombo Plan Colloquium on Intra-Regional Technician Training, 3d, Singapore, 1969. *Report.* p. 170-177. [d377.5: 62/Gail]

The authors attempt to indicate the importance of the engineering technician to the industrial scene. They also describe his functions and the courses of academic training that have been found to be appropriate to his needs. A discussion on the means of securing an adequate manpower supply in this field and in this part of the world is included.

Gretler, Armin. *The training of adult middle-level personnel.* Paris, Unesco, 1972. 164 p.

Unesco, in co-operation with ILO and other specialized agencies, has launched a long-term programme to contribute to the development of adult education for middle-level personnel. The present study was commissioned with a view to determining the extent of the problem of the lack of middle-level personnel and how it has affected economic growth and social development, and identifying and describing training programmes and the categories of manpower which belong to the intermediate level. Statistical information and laws and regulations relating to status and training requirements are discussed in separate chapters.

*Huq, Aminul. *Manpower planning and technician education.* [d331.024/Huq]

This paper examines the issue of planning technician education and training in harmony with manpower needs.

*______. *Planning and management of technician education.* [d377.014.542/Huq]

As well as discussing planning, the author examines the question of the organization and management of technician education systems.

ILO. First Meeting of the Technical Committee of the Asian Regional Skill Development Programme, Manila, 10-16 July 1979. *Report.* Bangkok, ILO, 1979. 91 p.

The Technical Committee approved the Rules of Governing the ARSDEP Technical Committee, reviewed the accomplishments of ARSDEP (1978/1979), and approved its activities for the years 1979-80, with the instruction that the Secretariat should determine as precisely as possible their objectives, modalities, and timing.

A seminar on the training of key personnel of national training services preceded the Technical Committee meeting.

ILO. General Conference, Sixtieth Session, Geneva, 4 June 1975. "Convention concerning vocational guidance and vocational training in the development of human resources", in ILO. Training Department. *Ten years of training...* Geneva, ILO, 1979. p. 259-263.

This is Convention 124, also cited as the Human Resources Development Convention, 1975. It embodies proposals for developing and adopting co-ordinated policies and programmes of vocational guidance and training closely linked with employment needs, stage and level of economic, social and cultural development, and the ability of an individual, without discrimination, to develop and use his capabilities for work in his own best interests and the needs of society.

*Jambulingam, A.P. *Investigation into the jobs technician holders do in industry.* [d62.007.2/Jam]

The questionnaire is designed to gather information about the jobs done by polytechnic diploma-holders. The information will then be used to help design a core curriculum for technician courses in polytechnics.

*Kannappan, Subbiah. *Flexible approaches to manpower planning.* [d658.3.012.2/Kan]

In this paper, the author examines the essential need for both educational and manpower planning to be flexible.

*Khan, Irshad H. "National planning of vocational and technical training", in Colombo Plan Colloquium on Intra-Regional Technician Training, 3d, Singapore, 1969. *Report.* p. 178-191. [d377.014.542/Kha]

The author explains the dependence of economic growth upon the speedy development of human resources, and highlights the importance of vocational and technical training.

*King, Kathleen C. "The role of technical education and training in developing countries", in Colombo Plan Colloquium on Intra-Regional Technician Training, 3d, Singapore, 1969. *Report.* p. 192-204. [d377:338.924/Kin]

The author discusses the main characteristics and problems frequently found in the 'new' countries, and indicates the dimensions of the difficulties to be overcome in providing the trained manpower which they so urgently need.

*Koh, Watt Seng. *Technician education in national development.* [d377:338.924/Koh]

The objectives of this paper are (1) to define the term "technician"; (2) to examine a training system in search of a function; (3) to discuss what technician training is not about; and (4) to present considerations in technician education.

*Kuniyoshi, Eiji. *Development of teaching/learning resources: teacher-made teaching aids.* [d371.693.2:531.784/.786/Kun]

Describes the construction of a teacher-made dynamometer for testing the performance of a small-size internal combustion engine.

*_____. *Optimum utilization of technical institution resources - equipment and materials.* [d371.64/.69/Kun]

Discusses the management of machinery, tools and measuring instruments, deals with the purchase and control of materials, gives examples of the utilization of equipment and materials, and outlines accident prevention/safety education.

*McCauley, John S. "Employer responsibility for developing middle-level manpower", in Colombo Plan Colloquium on Intra-Regional Technician Training, 1st, New Delhi, 1965. *Report*. p. 140-149. [d331.024/Mac]

This paper examines measures which could be taken to stimulate the growth of training in industry. Attention is also given to the need to encourage workers who are already employed in these occupations to take advantage of opportunities for advanced training and to continue the development of their careers.

McNown, John S., ed. *Staff development for institutions educating and training engineers and technicians; a study dealing with the special problems of developing countries*. Paris, Unesco, 1977. 127 p.

This publication is the fourth in the series *Studies in engineering education*, and comprises two main parts and a résumé prepared by the editor, reflecting contributions from many participants both in their written reports and in discussion at the Dar es Salaam (1974) and New Delhi (1976) meetings. The papers present a variety of experiences and illustrate problems and deficiencies in training. Some possible solutions to the problems are discussed.

*Mahler, F. "National development manpower and technical training objectives", in Colombo Plan Colloquium on Intra-Regional Technician Training, 4th Manila, 1971. *Report*. p. 132-142. [d331.024:377/Mah]

This paper considers the broad problem of human resources development. It examines, in turn, the objectives of the education system; methods of assessing the amount of manpower required in various occupational categories; and how these requirements can be taken into account in building up the school system, higher education and trade training.

*Mehta, M.M. "Planning technician training for integrated economic and social development", in Colombo Plan Colloquium on Intra-Regional Technician Training, 2d, Bangkok, 1967. *Report*. p. 7-20. [d377.014.542:338.984/Meh]

Morsy, Zaghloul, ed. *Learning and working*. Paris, Unesco, 1979. 348 p. Also French edition: Apprendre et travailler.

This book contains articles which appeared in issues of *Prospects*, Unesco's quarterly review of education, and which have been regrouped, placed in context and supplemented with formerly unpublished material. It touches a wide spectrum of problems in education, including the heritage of history and anthropology, education and work (getting to grips with the problem), polytechnic education as a generalized system, and lifelong education. Included is a reprint of extracts of a discussion through the *Symphony* satellite between Mr. Amadou-Mahtar M'Bow speaking from Nairobi, the site of the nineteenth session of the Unesco General Conference (1976), and Mr. Edgar Faure speaking from Unesco Headquarters, Paris.

*Mufti, A.G. *National policies of technician education and their relationship with national socio-economic goals*. [d377.338.924/Muf]

*Mufti, A.G. "Planning of technician education institutions", in Colombo Plan Colloquium on Intra-Regional Technician Training, 5th, Karachi, 1973. *Report.* p. 37-46. [d377.5.014.542/Muf]

The author discusses the general principles of planning technician education institutions, including their educational objectives, character, types of programmes, facilities and staff development.

*Parvez, Bashir A. *Equipping technician institutions.* [d377.16/Par]

A technician institution should be adequately and properly equipped according to the needs of its educational offerings. The author sets out to examine the criteria for selection, sources, lay-out and installation and the storage of equipment. A short discussion on the standardization of equipment, furniture and provision of training materials and consumables is also included.

*______. "Improving the status of technicians", in Colombo Plan Colloquium on Intra-Regional Technician Training, 6th, Kuala Lumpur, 1975. *Report.* p. 23-32. [d62.007.2/Par]

Technicians should achieve a clear functional identity before they can find their feet. Image-building should precede status-building. Technician education must be integrated in the overall system of general education and the technician curriculum should reflect an integral unity under an umbrella of certification and standardization. Association with industry is a *sine qua non* for any improvement in technician education and in its attendant status. Narrow specialization should be avoided to provide technicians with greater job mobility and adaptability. Foundation courses in industrial arts should form a prerequisite for technician education. Doors to higher technological education must be open to aspiring technicians. A professional character must be developed by the technician either on his own or in collaboration with existing professional bodies. A research base is essential for the growth of technician education. These major points which have a direct or indirect bearing on the question of status of technicians are reviewed in this paper.

*______. *Inspection and supervision of technician institutions.* [d62.007.2/Par]

In this paper, the author explains that inspection and supervision are complementary processes, designed and implemented expressly for monitoring the operation of institutional offerings, evaluating their strengths and weaknesses and suggesting measures for improving programmes. They supplement institutional self-evaluation. Inspection and supervision of technician institutions are not only desirable but necessary.

*______. *Major criteria for the planning and design of technician institutions.* [d377.5.014.542/Par]

The author discusses six major criteria for the planning and design of technician institutions. They are: 1) Location; 2) Functionality; 3) Flexibility; 4) Integrated approach to planning; 5) Comfort and convenience; and 6) Space norms and standards. All these operate integrally to achieve efficiency and economy in technician institution planning.

*______. *Management perspectives of technician institutions.* [d377.1/Par]

*______. *Planning the library in a technician institute.* [d377.5: 022.3/Par]

The author examines the factors that have to be taken into consideration when planning the library in a technician institute.

*Parvez, Bashir A. *Policies and processes of technician education planning and implementation.* [d377.014.542/Par]

*______. *Some aspects of personnel management in technician institutions.* [d377.1/Par]

The paper discusses educational management as a social technology; distribution of work; communications and information flow; staff participation, collaboration and co-ordination; leadership and support; staff development; and personnel management - a synthesis.

*______. *Some aspects of technician education planning and development.* [d377.014.542/Par]

The author begins with a discussion of the definition and purpose of planning. He then covers: training in industry as an adjunct to technician education, diversification of technician education, technician education as a fast-growing activity, the concept of terminality and the cost factor.

*______. *Space norms and standards in technician institutions.* [d377.162/Par]

The author surveys space utilization patterns, and norms and standards in technician institutions.

*______. *Technician functions.* [d62.007.2/Par]

This paper attempts to answer the following questions which are basic to any scheme of technician education and training in a given context: - Who is a technician? - What does he do? - How is he prepared for his job?

*______. *Understanding the technician.* [d62.007.2/Par]

The study examines the classification of technicians, the spheres of work and the abilities required. The implications in the educational preparation of technicians are also considered.

*Patil, P.B., comp. *Derivation of topics, subjects and subject aims. (Course support material for individual task 1.)* [d62.007.2/Pat]

Extracts from various sources are given in this document. Extract A deals with the identification of the technician engineer. Extracts B, C and E consist of activity analyses of mechanical and civil-engineering technicians. Extract D lists the functions of technician respondents and another extract is a job description of mechanical, civil and electrical engineering technicians.

*______. *A framework for planning in technician education.* [d377.014.542/Pat]

The author suggests a framework which can generally be used to formulate a strategy for planning in technician education.

*______. *Identification of technicians and education and training systems for technicians.* [d377.5/Pat]

The paper attempts to identify and define technicians in terms of their functions, responsibilities and field of work, and considers the factors which are needed for planning and structuring technician education systems. The work content of technician jobs is given in Appendices 1 and 2.

*Patil, P.B. *Suggestions for revision.* [d371.671.12.001.7/Pat]

This brief paper provides some suggestions for the revision of a self-instructional package.

*______. *Systems approach to technician education.* [d377.5: 005/Pat]

Systems approach means different things to people from different fields, but basically it can be viewed from three standpoints - systems philosophy, systems analysis and design, and systems management. The author sets out to define these standpoints and to show how they can be applied to the technician-education system.

*______. *A systems model for technician education.* [d377.5:005/Pat]

In educational organizations, planning is necessary at all levels, and is as much a part of operational sub-systems as of management. Many planning activities, even at the strategic planning level, will require participation of personnel from operational sub-systems. Keeping these points in view, the author proposes a conceptual model for a technician education system which can be used as a reference to analyse the technician education systems of various countries.

Psacharopoulos, George. *Education and work: an evaluation and inventory of current research.* Paris, Unesco: International Institute for Educational Planning, 1977. 147 p. (IIEP/S44/6A)

This document is part of the IIEP research project on 'Employment, the nature of work and educational planning', presented during an IIEP/SIDA/BMZ seminar organised by IIEP from 5 to 9 December 1977. It reviews several issues touching upon the relationship between education and work, and how these refer to educational planning. The issues range from theoretical ones to controversies raised by recent research findings. The author has scanned a considerable amount of material (published and unpublished) in order to arrive at a summary picture of what is happening in this field.

*Rafique, A. *Optimum utilisation of technical institution resources - buildings.* [d727.4/Raf]

The author seeks to suggest measures that should be taken by the management for optimizing the use of buildings and other facilities.

*Sakihama, Shuei. *Shop and laboratory safety in technician education.* [d614.8:377.5/Sak]

This paper discusses safety engineering, education and enforcement; causes of accidents and injuries; safety regulations; and fire and its prevention.

*______. *Workshop/laboratory management.* [d371.388/Sak]

A paper on: workshop/laboratory planning, the selection, purchase, maintenance and storage of machines, tools and equipment, and student personnel organization.

Sato, Kunio. *Vocational education and attitudinal changes in Asian countries. [Paper] presented at the Training Course on Educated Unemployment held in Islamabad, Pakistan, 5-14 November 1974.* Bangkok, ARTEP, ILO/Unesco, 1974. 36 p. Distribution limited.

Since the 1950s, the educational systems in Asia have been faced with quantitative expansion of enrolments owing to increased social demands for education. Educational systems are being questioned about their role in producing students with 'paper qualifications' which do not meet the employment opportunities in many countries in the region.

This paper examines two hypotheses: that those who are vocationally trained would obtain jobs with their skills, and that those enrolled in vocational courses would probably change their attitudes towards certain types of jobs which they otherwise would not consider. The paper considers whether experiences in some Asian countries can successfully prove the above hypotheses, and derives tentative conclusions.

*Sitaramarao, K. *Curriculum implementation.* [d371.214/Sit]

Some aspects of implementation of curricula are described through the presentation of a case study pertaining to the implementation of a specific curricular change in 30 technician institutions. Based on an analysis of this case, a methodology for the implementation of curricula is outlined.

*______. *Institutional objectives with the emphasis on the role of staff for achieving them.* [d371.2.017/Sit]

This paper deals with a method of developing institutional objectives and operational plans that will assist institutions in implementing and managing innovations with confidence and competence. The role and responsibilities of staff in realizing the objectives are also discussed.

*______. *An introduction to teaching methods and criteria for their selection.* [d371.3/Sit]

Important aspects of the learning process and the diversity of learning outcomes indicate the need for the use of a range of teaching methods. This is explained with the help of a learning model based on information processing theories. A brief description of a sample of teaching methods is included to indicate their strengths and limitations. Some criteria are identified and certain aspects of these are discussed to provide guidelines for the selection of teaching methods. The idea of a matrix for learning methods is outlined for the purpose of ensuring the use of a range of methods in teaching a subject.

*______. *Methods of writing objectives.* [d371.2.017/Sit]

Human performances can be classified for the purpose of improving the understanding of the learning process. The range of performances and the approaches for specifying learning outcomes in behavioural terms are discussed. An outline on the method of writing objectives is also given.

*Strachan, D. Alan. "Skilled hands for development", in Colombo Plan Colloquium on Intra-Regional Technician Training. 3d, Singapore, 1969. *Report.* p. 39-48. [d331-057.21/Str]

It is the duty of those employing labour in both the public and private sectors to make their needs known to the education authorities, so that the schools can turn out products which can be assimilated into their establishments with a minimum of additional training. Likewise, an enterprising education system should be alert to the changing of modern society. The author attempts to identify the problems involved.

Technical and vocational teacher education and training. Paris, Unesco, 1973. 240 p. *(Unesco. Monographs on education, 8)*

The purpose of this study is to illustrate through description and analysis trends and problems in the field of vocational and technical teacher education and training in industrialized and developing countries.

General types of organizations on the national level are presented as well as typical training patterns for the categories of technical and vocational teachers (general technical teachers, vocational teachers, workshop teachers, training officers/directors, instructors, etc.)

Problems on recruitment, curriculum development, the status of teachers, teacher certification and planning for change and expansion are also discussed.

*Thanoo Swaengsakdi. *Systems approach to technician education and planning.* [d377.014.542:005/Tha]

*Thavisakdi Srimuang. *Cost benefit, cost study and potential economics.* [d377.014.543/Sri]

The paper deals with cost-benefit and its dual, cost effectiveness. It scrutinizes the inner mechanics of cost as an analytical tool for planning, and investigates the methodologies of identifying potential savings in the face of growing student populations and mounting scarcity of resources. The underlying theme is how to obtain the most value for the money.

*______. *Socio-economic development and technician education.* [d377.5.330.19/Sri]

This paper discusses salient aspects of the impact of environmental factors on technician education, the methodologies currently employed in determining the quantitative and qualitiative parameters needed for planning and implementation, and the determination of goals, policies and aims. It also deals in brief with the definition of the technician concept in terms of its different classifications.

*Thompson, C.A. "The planning of technical education in relation to general education", in Colombo Plan Colloquium on Intra-Regional Technician Training, 5th, Karachi, 1973. *Report.* p. 15-25. [d377.014.542/Tho]

The author first deals with the needs of education in general. He then focuses on the education of the technician and elaborates on elements of planning with details on the planning process.

Unesco. *Implementation by Member States of revised recommendation concerning technical and vocational education, guide for indicating present situation and future plans.* Rev. ed. Paris, 1979. 19 p. (Unesco. ED/STE/TVE/3045)

As a follow-up of the *Revised recommendation concerning technical and vocational education* adopted by the Unesco General Conference at its eighteenth session (see title entry INFO TVE 3 below) this guide was prepared to help Member States ascertain the degree to which various elements of the *Revised recommendation* have been implemented and to summarize plans to improve the degree of implementation.

Unesco. Section of Technical and Vocational Education. *INFO TVE series.* Paris, Unesco, 1978 to date.

INFO TVE 1: *Guide for classification of information about technical and vocational education.* 2d. rev. draft. 1979. 42 p. (Restricted)

The guide provides justifications for the need for a specialized classification of information on technical and vocational education, and how it is used. A comprehensive list of terms classified in main categories and sub-categories is included, using a decimal system.

INFO TVE 2: *Guide for an international information network on technical and vocational education.* June 1980. (In preparation)

INFO TVE 3: *Implementation by Member States of the Revised Recommendation concerning technical and vocational education. Draft evaluation guide for indicating present situation and future plans.* 1978.

INFO TVE 4: *Educational employment: speculations for the future.* 1978. 30 p. (Restricted)

This trend paper reviews existing practices in the transition from school to work, and provides an outlook on possibilities for better links between school and employment. It advocates a one-to two-year period of educational employment after secondary education, bringing attitudes and aspirations into closer harmony with the employment opportunities offered.

INFO TVE 5: *A technical teacher education course: a suggested one-year curriculum.* 1978. 98 p. (Restricted)

This working document describes in Part I the development of a competency-based curriculum using a system approach. Part II outlines the objectives of 24 course-units and Part III provides some practical proposals for the implementation of the course.

INFO TVE 6: *Graphic communication: a proposed technical drawing course for general education.* 1978. 400 p.

A set of 18 individualized learning units for grades VII to IX (average age 12-15). Each unit contains objectives, information, practice and test sheets. Units include the basics of drawing, maps, graphs and charts, workshop drawings and dimensioning, and electrical drawings. A teacher's guide is also provided.

INFO TVE 7: *Printed technical learning material*
Part I: Development of printed material
Part II: Organization: International Illustration Bank
Part III: Reproduction techniques

This guide is addressed to teacher educators, administrators and curriculum developers working in developing countries. It includes directions on how to use worksheets effectively and how to manage the production of learning materials. There is also a discussion on the development of an 'international illustration bank'.

INFO TVE 8: *Curriculum development in technical and vocational education.* 1979.

INFO TVE 9: *Prototype workshops and laboratories: proposed planning methods and standards for equipment and facilities in technical and vocational education.* 1978. 2 v.

This draft guide provides an overview of planning methods and standards for facilities and equipment. In Part II, these methods and standards are discussed in the context of general technical education and technical and vocational education.

INFO TVE 10: *Production units and technical teacher education: a guide.* 1978. 39 p.

The main objective of the paper is to inform policy-makers, planners, teacher educators and education managers on the development of a production unit, and its possible contribution to the solution of critical problems in the training of technical education teachers. Such a unit would fill a gap in the facilities generally available to prospective technical teachers in developing countries, and would be in keeping with the trend of integrating education and work.

INFO TVE 11: *Project work.* June 1980.

INFO TVE 12: *Objective testing.* October 1980.

Unesco. Regional Office for Education in Asia and Oceania. Educational Facilities Development Service. *Guidelines for planning of facilities for technical and vocational education*, by Amphon Pitanilabut. Bangkok, Unesco, 1979. 42 p. *(Educational building report 10)*

This planning guide begins by defining technical and vocational education and describes how constraints in resources can impede development in this area. Facilities planning in relation to building remodelling and the construction of new buildings is discussed, as well as the preparation of educational specifications for buildings, furniture, equipment and sites. An outline of the methodology of planning costs is also provided.

/Unesco and Colombo Plan Staff College for Technician Education/ Regional Seminar on Technical and Vocational Education in Asia and Oceania, 20-27 November 1979, Singapore. *Report.* Bangkok, Unesco/Singapore, CPSC, 1980. 35 p. and 1 v. (various paging of country papers)

Participants from 20 countries in the region of Asia and Oceania exchanged ideas and experiences about current problems and issues in technical and vocational education, the development of innovative approaches to curriculum design, instructional resources, the training of teachers, evaluation and work experience. Deliberations were centred on how productive work could be made an integral component of technical and vocational education, and relevant work experience effectively organized and extended to rural areas. New strategies and methodologies needed for improving the curriculum were examined, as well as action-oriented programmes and research which should be undertaken to improve vocational and technical education.

/Unesco/ European Regional Meeting, Venice, 7-11 November 1977. *Youth and work, the incidence of the economic situation on the access of young people to education, culture and work; report, recommendations and documents.* Paris, 1979. 173 p.

This paper contains the final report, recommendations and documents of a European regional meeting on the influence of the present economic situation on the access of young people to education, culture and work. The Venice meeting was one of a series of regional youth meetings organized by Unesco to bring to light new points for consideration and new approaches to action regarding major problems which youth and society in general are encountering. In discussions on the problem of unemployment, existing educational policies and training programmes were reviewed, and immediate steps were suggested to make education responsive to the needs of youth.

/Unesco/ Expert Meeting on Educational and Vocational Guidance for Girls and Women, Paris, 6-10 September 1976. *Vocational guidance for girls and women.* Paris, Unesco, 1976.

The paper raises a number of questions relating to the formulation of policies and the development of practices in vocational guidance, with special reference to the equality of girls and women in training and employment. Possible differences in approach are identified with regard to vocational guidance for the two sexes.

Unesco. General Conference, 18th session, Paris, 19 November 1974. *Revised recommendation concerning technical and vocational education adopted by the General Conference.* Paris, 1975. 99 p. (In Arabic, English, French, Russian and Spanish)

*Varshney, B.G. "Training methodology for technician training in industry", in Colombo Plan Colloquium on Intra-Regional Technician Training. 2d, Bangkok, 1967. *Report.* p. 99-105. [d331.86/Var]

The objective of this paper is to present a new approach to mutual co-operation in the growth and development of the comparatively new science of 'training methodology' which is emerging as a vital force in meeting the challenge of skilled manpower problems faced by industries.

*Vergara, Jose R. *Selection of students in technician institutions including a review of preparatory school or pre-technical education.* [d377.18/Ver]

In the first part of the paper, the author deals with the profile and need for student selection in technician schools, and the general admission procedures in technician education. The second part is a review of preparatory school education in relation to technical training.

*______. *Technician education curriculum and the evaluation of learners performance.* [d377.121.4:377.126/Ver]

The author discusses the designing and development of the technician curriculum; its evaluation, strengths, and weaknesses, and difficulties in its implementation. Include also is an outline for curricular revision and delivery mechanisms, and competency-based assessment.

*Verma, L.N. *A case study on defining curriculum of technician courses in terms of behavioural objectives.* [d371.2.017/Ver]

The purpose of the case study is to share experiences in defining the curriculum of technician courses in terms of behavioural objectives, the advantages gained, its impact on learning and testing, problems and their solutions.

Warren, Hugh A. comp. "Technical and vocational education, select bibliography", *Educational documentation and information: Bulletin of the International Bureau of Education,* Year 47(186):17-85, 1st quarter 1973.

AUSTRALIA

Agricultural Science Materials Project (ASMP) [*ASMP Units*] Student's and teacher's editions. Canberra, The Curriculum Development Centre, 1979. 25 v. (25 units)

The ASMP materials were developed in workshops for teachers of agriculture in six areas of New South Wales, and consist of 25 units to serve as an introduction to agriculture studies in lower-secondary schools. Each unit is outlined, and presents objectives, suggested content, guided questions and activities. The teacher's edition suggests alternative teaching approaches and includes test questions and support materials. The illustrations in cartoon style "drive home the points clearly" and make instructional units, which could otherwise be dry reading, enjoyable to study. The materials also have relevance to teachers and students engaged in the study of integrated science, biology and environmental education.

Australia. Committee of Inquiry into Education and Training. *Education, training and employment: report*. Canberra, Government Publishing Service, 1979. 3 v.

In the wake of the growing social problem of youth unemployment, a Committee was appointed by the Prime Minister in 1976 to look into the role of the education system in preparing young people for work, and to study the relationship between the education system and the labour market. This report reviews the major changes that have taken place in education in Australia in the past 20 years, and presents projections in enrolment at various levels of education for the years 1981 to 2000 for which education facilities and services must be provided.

Among the recommendations considered important for a successful transition of students from school to work is one suggestion that secondary schools put greater emphasis on teaching literacy and numeracy and develop testing devices to check the achievement of these basic skills. The proposal for the establishment of a National Centre for Research and Development, to analyse skills required for various occupations in middle-level and trade fields and to develop modular programmes in trade training, has been approved and supported by the Commonwealth and State ministers.

The Committee of Inquiry composed of ten members was headed by Professor B.R. Williams (Vice-Chancellor and Principal of the University of Sydney), and this report of the Committee is often referred to as the Williams Report.

______. Commonwealth Department of Education. Working Party on the Transition from Secondary Education to Employment. *Report*. Canberra, Australian Government Publishing Service, 1976. 139 p.

This is the report of a Committee formed in 1974 by the Commonwealth Department of Education to examine and report to the Australian Education Council on problems related to the failure of secondary school graduates entering employment to adjust to work situations.

The Committee's findings show that there is much unevenness in the quality and extent of vocational preparation services offered to young people· it therefore recommends the creation of a mechanism to plan and co-ordinate policies for their vocational preparation through services both in and out of school.

______. Commonwealth Government. *Responses to the recommendations of the report of the Committee of Inquiry into Education and Training (Williams Committee)*. Canberra, 1979. 31 p.

This paper summarizes the recommendations of the Williams Committee and provides a concise statement on the Government's response to each recommendation. In order to facilitate understanding of the general lines of the Government's response to the report, general comments on its reactions precede each chapter. The Government will report annually to Parliament for a period of three years as a follow-up to the Williams Report.

______. Commonwealth/State Working Party on the Transition from School to Work or Further Study. . . *First report*. Canberra, Australian Government Publishing Service, 1978. 32, xvi p.

Australia. Department of Education. Research Division. *Australia: Combining education and work...* Bangkok, Unesco, 1978. 31 p. *(Unesco. Combining education and work: experiences in Asia and Oceania)*

Contents: general description and policy trends; reorientation of school programmes to combine education and productive work experiences; combining education and work for out-of-school population; work experience programmes in Victorian secondary schools; work experience programmes for handicapped secondary-school-age students in New South Wales; and students' social and vocational assessment sheet.

______. Schools Commission. *School and work: a discussion paper.* Canberra, 1977. 23 p.

The paper discusses the introduction of elective vocation-oriented courses into the secondary-school curriculum, closely matching the courses with the basic expectations of the community. It points out the role of educational institutions in providing a system of recurrent education which would allow workers to move to higher occupations.

______ (South). Department of Further Education. *Case study: Australia /presented at the/ Meeting of National Delegates on Developments in Recurrent Education,* Paris, 1977, by G. Coyne. Paris, OECD/CERI, 1977. 43 p.

Part 1 is a comparative analysis of the systems of technical and further education in New South Wales and South Australia. Part 2 presents Croydon Park Technical College, South Australia. The study shows how Australia's technical colleges strengthen school-community relationships through enabling a greater number of students to attend courses in vocational education.

The Australian TAFE Teacher (Official journal of the Technical and Further Education Teachers' Association of Australia) 300 Sussex Street, Sydney 2000, c/o NSW Teachers' Federation. Quarterly. $5

Karmel, Peter. *Youth education and employment.* Hawthorn, Victoria; Australian Council for Educational Research, 1979. 19 p. (Radford Memorial Lecture) ISBN: 0 85563 203 8 $2.00

There are few aspects of Australian education as topical as the relationship between education, training, and youth employment. The author draws together recent and projected trends in the education and employment sectors. It is argued that a range of factors have placed large numbers of young people at a disadvantage in the labour market and that this situation is likely to persist in the future.

Accordingly unless a comprehensive youth policy is adopted by government, unemployment will be the only choice facing many young people. A positive policy would offer youth activities ranging from full-time employment to full-time education and training with a number of combinations of part-time employment and part-time education as further options. A number of innovative examples of such programmes are outlined. (ACER)

McKenna, A. "Apprenticeship a relic of the past - or a plan for the future?" *Australian TAFE Teacher* 10(1):21-27, March 1978.

Various apprenticeship programmes are examined to determine the reasons for the decline in the number of apprentices being employed. Reasons discussed are: the system has become far too expensive for employers to indenture and train apprentices; training is carried on without considering all parties involved; since the inception of the apprenticeship

system little change has taken place to improve facilities, equipment and teaching staff; need for projected manpower planning, need for a centralized controlling body to co-ordinate operations to ensure adequate and correct information and for accreditation of work. Points for consideration are listed by the author for institutions offering internship programmes.

New South Wales (Australia). Department of Technical and Further Education. *Handbook 1979.* Broadway, N.S.W., TAFE Information Centre, 1979. 640 p.

This handbook may be consulted for information on technical and further education in N.S.W. and on the Council of Technical and Further Education. Directory information covers 22 metropolitan and 52 country technical colleges plus over 140 associated centres and mobile instructional units. Course descriptions are given along with information on admission requirements, types of courses, fees, financial assistance, arrangements for apprenticeship, and student and educational services.

Sturman, Andrew. *From school to work: a review of major research in Australia.* Hawthorn, Victoria; The Australian Council for Educational Research Ltd., 1979. 114 p. (*Australian education reviews, no. 13*)

The broad aims of this review are (i) to obtain information about the post-school experience of school leavers which might be seen as having implications for the structure, timing, and content of secondary education; (ii) to feedback into school decision-making the perceptions of ex-students about the strengths and weaknesses of their school experience; (iii) to identify critical points in school experience where particular types of failure or particular choices made have predictable long-term effects; (iv) to test the association between school attainment and length of schooling, and the relationship of both to post-school options of students; (v) to examine the relationship between social background, sex, ethnic origin, and geographical location on the one hand, and school and post-school achievement and options on the other. (ACER)

Swinburne College of Technology, Hawthorn, Victoria and New South Wales Institute of Technology, Sydney, N.S.W. *Development of co-operative sandwich education; joint research project, granted by the Commission on Advanced Education.* Canberra, Commission on Advanced Education, [1975] 2 v. (various paging)

Co-operative sandwich education covers programmes in which students are exposed to work experiences which are related and integrated to the course of study or classroom experiences in a planned way and are effected by a teaching institution through periods of full-time study and full-time work. This research project was conducted to determine what courses require a combination of full-time work experience and full-time academic experience, and to make a comparison of such courses. The attitudes of students, teachers and employers towards such courses were also studied. The findings provide guidelines for the future development of such courses.

TAFE Quarterly. Haymarket, Sydney, NSW 2000; Information Services Division, NSW Department of Technical and Further Education, P.O. Box K638; 1979-

The issues to date cover the following themes: TAFE and the changing world of work; Beyond the world of work; Images of TAFE. The *Quarterly* features accounts of Technical and Further Education (TAFE) in each of the states and provides lists of TAFE Colleges.

Western Australia. Post-Secondary Education Commission. *Report of the future of technical education in Western Australia.* /Perth/ 1977. 60 leaves.

"Youth and the world of work," *TAFE Quarterly* 1(2):30-32, Winter 1979.

This article describes three programmes administered by TAFE in New South Wales to improve the employment prospects of young people and their awareness of the nature of various jobs and the job market. The three programmes are the Pre-apprenticeship courses, Link courses and the Education Programme for Unemployed Youth (EPUY).

BANGLADESH

Bangladesh /Ministry of Education/ Directorate of Technical Education. *Education and training facilities.* Dacca, 1978. 23 p.

The Directorate of Technical Education was established in 1960 to provide leadership in the development of technical education in the country. Since then a number of institutions have begun to offer vocational training. This publication lists the institutions and gives details about the aims of their technical education programmes, requirements for admission, courses offered, duration of training and other relevant information.

Dacca, University of. Institute of Education and Research. *Bangladesh: combining education and work.* Bangkok, Unesco, 1978. 48 p. (*Unesco. Combining education and work: experiences in Asia and Oceania*)

Contents: general description and policy trends; reorienting school programmes to combine education and productive work experiences; combining education and work for out-of-school populations; project report: Bangladesh Rural Advancement Committee (BRAC); Muktangan (outdoor) Primary Education Project.

______. ______. *Survey of primary schools and evaluation of primary school agricultural programme in Bangladesh (a research report).* Dacca, 1977. 2 v.

The Education Directorate, in collaboration with UNICEF, launched a programme of practical agriculture education in the primary schools of the country to implement the practical agriculture aspects of the General Science Syllabus for Classes IV and V as well as to improve classroom teaching on agriculture and nutrition. Through the teaching of these subjects knowledge of agricultural practices should be diffused through the students to their homes.

In 1975 a study was made to evaluate the programme. The study pointed to the following problems that need to be looked into in order to make the school agricultural programme meaningful: provision of sufficient cultivable land; appropriate distribution of trained agriculture teachers as well as the need for more agriculturally trained teachers; appropriate and fair distribution of seeds and agricultural implements; improved methods to increase yields and diversify products; adequate irrigation facilities; lack of books on agriculture; and support of community members and government officials concerned with agricultural development.

Kibria, K. F. Md. Gholam. *An evaluation of horticulture education programme in the primary schools of Bangladesh, 1976-77; (a research report).* Dacca, Institute of Education and Research, University of Dacca, 1977. v, 77 p. mimeo.

This study, which was undertaken at the request of the Education Directorate, Government of Bangladesh and funded by UNICEF, reports that 96 per cent of primary schools, located in rural areas, account for 94 per cent of the total enrolment at the first level. Over 75 per cent of the population is engaged in agriculture for its livelihood. Not only does the country have to depend upon agriculture to contribute to the improvement of foreign exchange, but to improve the nutritional standards of the people. The drop-out rate recorded at the primary stage was as high as 10 per cent, and most of the unfortunate pupils resort to agriculture for their livelihood.

In the contest of the Bangladesh situation, there has been an increasing realization of the need to include a practical agriculture education programme in the primary schools which would provide pupils with the basic knowledge and skills needed for agriculture practice, food production and nutrition.

Starting in 1970 Bangladesh launched a programme of practical education at the primary level. This publication is a preliminary evaluation study of the practical agriculture programmes in order to pin-point impediments faced by the programme and suggest possible remedies for improvement.

Ritzen, Jo M., Lalit M.S. Roy and Judith Balderston. *A study of polytechnics in Bangladesh.* Berkeley, School of Education, University of California, 1973? 1 v. unpaged.

This monograph analyses the following questions with regard to polytechnics in Bangladesh: (1) Could the manpower bottleneck for technical trained manpower be removed with institutionalized technical training? (2) Does the cost of technical training outweigh its benefits? and (3) Are there better ways to manage institutionalized technical training in view of the manpower? Based on the findings of this study a "decision model for diploma courses" is presented in the final chapter.

BURMA

Burma. Ministry of Education. *Socialist Republic of the Union of Burma: combining education and work,* *[country study]* prepared by Tun Lwin. Bangkok, Unesco, 1978. 30 p. *(Unesco. Combining education and work: Experiences in Asia and Oceania)*

Contents: General description and policy trends; Reorienting school programmes to combine education and productive work experiences; Combining education and work for out-of-school population; Project report: regional colleges in Burma: voluntary labour contribution by students in Burma.

Maung Theik Pa. "Marine Diesel Training School", *Forward* XVI(1):4-7, 1 October 1977.

The school's main purpose is to provide trainees with comprehensive training until they attain a high competency in the maintenance and repair of diesel engines.

CHINA

Frazier, Calvin and Riles Wilson. "Work and study," *Chinese Education* XI(4):68-85, Winter 1978-79.

The authors' observations of schools in China conclude that education and work are closely related at the kindergarten and primary levels not only through instruction of the pupils on the importance of productive labour, but also through actual participation by young children in real-life productivity activities. Programmes relating work and study in the middle schools and in colleges and universities are described as being similar to those in the primary schools, only differing in quality of experience and intensity. The authors point out that in China, work and study have been integrated to a degree unsurpassed elsewhere in the world.

"Running key schools well" and "New teaching system for primary and middle schools," *Peking Review* 21(8):14-15, 24 February 1978.

Twenty key schools around the country were placed directly under the Ministry of Education to serve as pace-setters in industry and agriculture. The schools, run by departments of petroleum, metallurgy, coal and geology, are to stress subjects related to their special lines, and the students are to take part in productive labour in these fields.

School-run factories and farms (or branch schools in the countryside) are to have regular links with factories and rural production brigades. In this study arrangement, students can be educated by workers and peasants, and a correct attitude towards physical labour can be fostered.

"Schools of diverse forms," *Peking Review* 21(7):11-13, February 1978.

To accelerate the modernization of agriculture, industry, national defence, and science and technology, workers' and peasants' colleges and correspondence schools assisted by radio and TV networks have been set up in various parts of the country. These schools or short-term classes, run by factories or people's communes. as well as industrial departments under the State Council, are quickly training large numbers of technicians who are urgently needed.

The courses involve part work and part study, and the students upon completing their studies attain a level equivalent to that of graduates of college or secondary vocational schools.

"Spare-time education for workers," *Beijing Review* 22(35):8, 31 August 1979.

Statistics show that around 81.4 per cent of the nation's total number of workers have had no more than a junior middle school education, some are illiterate or semi-illiterate, and about 70 per cent of the industrial workers are below third-grade level in working techniques and skills. Engineers and technicians acount for only 1.6 per cent of the country's workers.

As full-time schools cannot possibly cope with the training of workers to expedite the "four modernizations" (agriculture, industry, defence, and science and technology), spare-time schools run by factories, mines and trade unions are playing their role in raising the cultural level and technical and managerial skills of workers, thereby boosting the labour productivity of these enterprises.

"Stress on secondary technical education," *Beijing Review* 22(37):7-8, 14 September 1979.

Figures issued by the State Statistical Bureau in June 1979 show that of 65.48 million junior and senior middle-school students in the country, only 880,000 are in secondary technical schools. With the accute shortage of trained personnel in automation technology, electronics, enterprise management and those related to commerce, service trades and tourism, measures are being taken in many secondary technical or vocational schools, including agricultural middle schools, to improve the situation.

"TV University," *Beijing Review* 22(7):7, 16 February 1979.

TV universities have been started in Beijing and other cities to provide scientific and technological knowledge to people to accelerate the "four modernizations". The Central Broadcasting and Television University in Beijing and Shanghai offer courses in mechanical engineering and electronics. The TV University in Beijing provides the syllabi and textbooks for similar universities in other parts of the country. The courses include mathematics, physics and chemistry, and a credit system has been adapted. The courses cover a period of three years and recipients of diplomas will be recognized as college graduates. Students are mainly workers of factories, mines and other enterprises.

INDIA

Andhra Pradesh. State Council of Educational Research and Training. Department of Educational Foundations. *Guidelines for orientation courses on socially useful productive work.* Hyderabad, 1978. vi, 66 p.

The Government of Andhra Pradesh has decided to introduce socially useful productive work in all schools in the state. For this purpose, eight colleges of education have been identified as centres for training for key persons to teach socially useful productive work (SUPW) in the schools. This document gives guidelines in the organization of training programmes and outlines the theoretical and practical aspects of SUPW. Sample activity plans, and a blueprint for organization of courses are included in the appendices.

Buch, M.B. and P.A. Patel. *Towards work-centred education, a programme of socially useful productive work in education.* Ahmedabad, Gujarat Vidyapith, 1979. 137 p.

This publication embodies the group thinking generated at a national workshop as well as the ideas of Smt. Pilos Buch in a publication entitled *Socially useful productive work - an innovation in school curriculum.* The aims and objectives of the concept of Socially Useful Productive Work are explained and guidelines are provided for implementation of the concept in schools and for training teachers.

"Detailed syllabi for 23 vocations at two stages," *NCERT Newsletter* III (7):2-3, June 1977.

The objectives of each course are given for the two years above the 10-year schooling. While 50 per cent of the time of the students is devoted to practical training, the other half is spent in acquiring knowledge in basic sciences and social sciences relevant to the vocation. In the syllabi for the courses, a list of reference books and suitable equipment for running the courses is included.

Fuller, William P. "More evidence supporting the demise of pre-employment vocational trade training: a case study of a factory in India", in *Comparative Education Review* 20(1):30-39, February 1979.

The author examines the relationship of training and performance in specific jobs, and explores the relative effects of alternative types of job training on the performance of workers in a large, modern factory in

South India. Some of the findings of the study show that additional years of secondary schooling add to worker performance, and may improve a worker's ability to learn on the job. Workers who mastered their trade in a firm are more productive than workers who were trained in a vocational institute; however, the latter are promoted more rapidly as management seems to give undue weight to formal training credentials. In-employment training appears to be less costly than pre-employment vocational training in preparing workers for certain trades.

Grewal, J.S. *Vocational environment and educational and occupational choices.* Agra, National Psychological Corporation, 1980. 272 p.

This study was based on the premise that educational and vocational development are integral to the well-rounded development of students. To test this, the study examined the influence of various types of environments on the growth and development of adolescents. In more specific terms, the relationship between environment and vocational choice behaviour of adolescents studying in the last year of higher secondary stage was studied.

India. Central Board of Secondary Education. *Socially useful productive work - guidelines for teachers.* New Delhi, 1979. 65 p.

The guidelines have been prepared to help teachers understand the various aspects of the concept of Socially Useful Productive Work (SUPW) in order to plan and implement the Board's programmes. The appendices provide a list of suggested activities, specimen plans and schemes of study. Guidelines for evaluating SUPW activities and programmes are also given.

/_____. Ministry of Education and Social Welfare/. *India: combining education and work, /a country study/* Bangkok, Unesco, 1978. 53 p. *(Unesco. Combining education and work: experiences in Asia and Oceania)*

Contents: Background; Socially useful productive work; Vocationalization; Work-experience programmes in school - a status survey; Lok Bharati, Sanosra (District Bhavnagar); Rural higher education institute, Birauli; A package plan for rural development through education (Madras); The rural university project (Ahmedabad).

_____. _____. *Work experience in schools; Third All India Educational Survey.* New Delhi, 1977. 76 p.

_____. _____. National Review Committee on Higher Secondary Education with Special Reference to Vocationalization. *Learning to do: towards a learning and working society; report.* New Delhi, 1978. 60 p.

The Committee recommends that learning be based on work, either through socially useful productive work which has been woven into the General Education course prescribed in the report, or through vocationalized courses. The Committee also recommends that the vocationalized courses to be offered at the higher secondary level be in agricultural and related rural occupational areas, and in managerial, commercial, health and para-medical vocations. Vocational courses at this level for the manufacturing, industrial and engineering occupations are not recommended.

_____. _____. Review Committee. *Programmes of workers' education of the Ministry of Education and Social Welfare; report.* New Delhi, 1977. vi, 132 p.

The Committee was appointed on 7 August 1976 to review the Scheme of Workers' Social Education Institutes and the Scheme of Polyvalent Adult

Education Centres, both of which serve the urban adult worker. It examined education for workers in general, including provision of facilities for basic learning skills, vocational and technical advancement, recreation and physical culture, and a critical understanding by the worker of his predicament and of the environment in which he lives. The learning needs of the worker's family were also examined. The Committee suggested the merging of the two Schemes above under the name Scheme of Non-formal Education for Workers, in order to afford workers the type of training offered by both Schemes, and to enable adult educators to explore the possibility of providing a new orientation for workers' education.

India. Ministry of Education and Social Welfare. Review Committee on the Curriculum for the Ten-Year School. *Report* . . . (including syllabus frame). New Delhi, 1977. 178 p.

______. ______. Working Group on Technical Education. *Report*. New Delhi, 1978. 134 p.

An assessment of the present status of the country's needs for national development. In-depth studies were done in the following areas of concern: technical manpower; research and development; diversification and re-designing of existing programmes; quality improvement; industry-institutional collaboration.

______. ______. Working Group on Vocationalization of Education. *Report*. New Delhi, 1978. 35 p.

The Conference of Ministers of Education of the States and Union Territories held at New Delhi in August 1977 urged reorganization of higher secondary education to prepare the increasingly larger number of school leavers for different vocations. Besides evolving a suitable curriculum, it was recommended that strong links be developed between education and various departments such as industry, commerce, agriculture, health and community development.

A Working Group on Vocationalization of Education was set up to review the programme of appropriate institutional and non-institutional programmes for imparting skills both in the rural and non-rural sectors. This report lists the Working Group's suggestions for utilizing existing facilities to take care of these programmes, and for providing new facilities, if necessary, for training the school leavers for immediate employment.

______. National Council of Educational Research and Training. *The curriculum for the ten-year school - a framework*. New Delhi, 1975. 53 p.

The present document was produced as a framework to guide the individual states in their development of the curricula for the 10+2 school system.

With regard to work experience at the lower primary stage, a beginning is to be made with simple, creative, self-expressional activities performed with locally-available material and simple tools. In the upper primary and secondary stages, the use of a variety of tools may be introduced. Work experience areas should be identified through community surveys and, whenever necessary, the expertise of artisans and mechanics should be utilized for the programme. In order to provide learners with experience in a number of areas of work, it is suggested that each successive semester consider different kinds of work experience. Learners may be given the opportunity of specializing in a particular area of work by following it successively at different levels. In grades IX and X, it would be desirable to provide experience of working in a farm or factory. Work experience should be viewed as a basis for integrating knowledge obtained in the classroom, and should provide the pupil with a chance to obtain earnings in cash or kind.

India. National Council of Educational Research and Training. *Higher secondary education and its vocationalisation.* New Delhi, 1976. 23 p.

In recent years, Indian educators have devoted considerable time and attention to the restructuring of the education system. The focus has been on the second level and its 'vocationalisation'. Proposals have been made for a move toward a ten-year school of general education with an additional 2 years of upper secondary education divided into two streams: one providing vocational education and the other general education. Transfers between streams would be possible. Courses in the vocational stream would be provided in accordance with manpower needs of the area. A combined semester and credit system and the possibility of correspondence and part-time education would also allow for in-service education.

This document is designed as a practical guide to the States in restructuring their higher secondary education. It is intended to present a "balanced and coherent picture of what has to be done" in bringing about the "important structural and functional changes in the whole set-up" to achieve vocationalization as a major transformation in education.

_____. _____. *Occupational literature published in India: an annotated bibliography 1978*, by J.S. Gaur and R.K. Saraswat. New Delhi, 1978. 71 p.

_____. _____. *Socially useful productive work curriculum, developing and implementing the programme*, prepared by S.C. Chaudhari. New Delhi, 1979. 63 p.

The document is a follow-up of the analysis of the recommendations of the Ishwarbhai Patel Committee which reviewed the Ten-Year School Curriculum and pointed out that reaffirmation of the Gandhian concept of Socially Useful Productive Work (SUPW) is the very first step in steering the present educational system in the right direction. Salient features of the concept of SUPW and its incorporation in the curriculum are outlined. The appendices contain a syllabus frame of SUPW, a sample of a *Doing-Learning Unit* and other illustrations useful to field workers in developing and implementing the programme of SUPW.

_____. _____. Department of Education in Science and Mathematics. *Organization of training programme for workshop instructors (a suggested model)* New Delhi, 1977. 121 p. illus.

The five parts in this manual are divided as follows: a suggested model for the training of workshop instructors for 10-15 days with a syllabus for the training course and details of instructional work; workshop tools and their use with emphasis on the importance of observing safety measures; information on the properties and applications of commonly-used materials (wood and metals); important steps to observe before starting a project and provides a list of useful assignment projects; evaluation, both for evaluating the effectiveness of the programme, and for evaluating the progress of the trainee. The appendices include lists of tools supplied under the UNICEF-assisted Science Education Programme (SEP). The manual is illustrated with photographs which identify workshop tools, and show how they are handled.

India. National Council of Educational Research and Training. Work Experience and Vocationalization of Education Unit. *Work experience: why, what and how?* New Delhi /n.d./ 1 foldout. illus.

Kerala. State Institute of Education Orientation Course in Work-Experience for Key Persons in the Education Department, Trivandrum, 8-13 November 1976. */Proceedings, group reports, and papers/* Trivandrum, State Institute of Education and New Delhi, National Council of Educational Research and Training, 1976. 112 p.

Orissa. State Institute of Education. *A study of the existing pattern of work-experience in the primary schools of Orissa, a sample survey, 1975-1976.* Bhunbaneswar, The Institute /1976/ 45 p.

The study located 34 types of work-experience engaged in by primary children, relating to health and environmental sanitation, food, clothing, shelter, recreation, academic work, and crafts and technical work. The manual activities are generally informal, *ad hoc*, and traditional. The study recommends that the Orissa State Institute of Education execute the following plan of action:

- Contact the schools where productive manual activities like toy-making, fruit and crop cultivation, pottery, cane and bamboo-work, plasticine-work, pisci-culture, dyeing and leather-work are in practice, in order to examine the nature and scope of such activities and seek ways for the improvement of such activities in the light of the curricular change in the ten-year schooling;
- Prepare instructional materials and teachers' handbooks on the above productive types of work in collaboration with appropriate experts and institutions;
- Develop an evaluation model to assess the work of students as well as teachers under the programme, and for purposes of certification;
- Examine whether the family trades like carpentry, balcksmithy, oil-milling and weaving in the environs of the schools can be included in the general programme of school education.

*Rao, G.N.N. *Case study on laboratory innovations in polytechnic education system: engineering experimentation course.* /d371.388:377/Rao/

This study briefly explains how the polytechnics in the Western Region of India are being assisted to improve laboratory instruction.

*Saran, Y. *Reorganization of polytechnic courses: multi-entry and credit system.* /d377.121.4(540)/Sar/

The author reviews the present polytechnic scene in India and discusses his recommendations on the reorganization of polytechnic courses and its implications.

*______. *Reorganization of polytechnic education in India - Bhopal experiment.* /d377.5(540)/Sar/ .

Depicts the trends of development in relation to technician education in India from the 1940s, the nature of its expansion since then, the factors which precipitated a crisis in technician education and the constraints at the stage of launching curriculum development projects.

Shankar, Uday. "Vocationalization at + 2," *The Rajasthan Board Journal of Education* XIII (1-2):4-8, January-June 1977.

The author presents his opinions as to why the + 2 years of vocationalization, known as higher secondary education, should not be added to the 10 years after high school. The author is of the opinion that the standard of 10-year schooling should be improved before increasing the school years. The vocationalization of secondary education at + 2 is recommended for vocational, trade, commercial, and industrial schools, and at polytechnics.

Singh, Budh. "Involvement of industries in education," *The Rajasthan Journal of Education* XIII(1-2):1-3, January-June 1977.

A report of how business and industrial concerns have placed at the disposal of adopted schools technical guidance and training facilities in response to the call of the Board of School Education, Haryana.

*Technical Teachers' Training Institute, Bhopal. *Monograph on approaches to improvement of laboratory instruction in polytechnics.* /d371.388:377/Tec/

"Vocationalization of education," *Teacher Today* 18(1):28-65, July-September 1975.

This paper describes a programme which can bring education into closer relationship with productivity by giving a strong vocational bias to secondary education and increasing the emphasis on agricultural and technological education at the university stage.

Vocational preparation comprises vocational education, which aims at laying the foundation for the world of work, vocational training in a specific skill or set of skills and experience under a real production situation related to the vocation identified for the learner.

INDONESIA

Asian Regional Expert Meeting on Vocational Training, Sydney, 2-20 December 1968. *Questions and summary of replies to questions.* Geneva, ILO, 1968. 1 v. (various paging) (ILO/ARVTP/Sydney/II,1-10)

Indonesia. Ministry of Education and Culture. *Project of the Government of Indonesia.* Jakarta /1976?/ 28 p. mimeo. (United Nations Development Programme)

______. ______. Directorate General of Nonformal Education and Sport. *Educational and vocational guidance for girls and women, country paper, Indonesia.* Jakarta /1976?/ 23 p. mimeo.

Statistical figures show a high percentage of illiteracy and lack of education among women. Through the Government's Family Life Education Project, efforts are being made to expand opportunities for education for women, especially in the rural areas. The Project includes training courses to develop vocational skills which will help women to earn.

______. ______. Directorate General of Primary and Secondary Education. Directorate of Technical and Vocational Education. *Development of technical and vocational education in Indonesia.* Jakarta, 1976. 15 p. mimeo.

"Non-formal education in Indonesia," *Education in Asia and Oceania: reviews, reports and notes* (13-14):23-31, September 1978.

Case studies on vocational skill training, family life education, basic education, village credit bank, and village development.

"Skill Development Centre, Indonesia," *INNOTECH Newsletter* 1(5):2, February 1973.

Soewargana, Oejeng. *Non-formal education for community education and rural community development.* Bandung, Ganaco, 1978. 24 p.

JAPAN

"Financial assistance to small-scale employers for paid educational leave and vocational training," *Social and Labour Bulletin* (3):341, September 1975.

Japan. [Ministry of Education? *Vocational education in Japan] national report for OECD... Inter-governmental Meeting on Vocational and Training.* [Tokyo] 1978. 45 p. mimeo.

The report covers the system, present status and policy of vocational education. The state of vocational education as an integral part of school and the state of vocational training undertaken in vocational training institutions are reported at length. The last chapter discusses the relationship of employment to vocational training.

______. National Commission for Unesco. *Technical and technological education in Japan.* Tokyo, 1972. 198 p.

______. *Laws and ordinances relating to industrial education in Japan.* Tokyo, 1959. 274 p.

Kishigami, Sadao. *Vocational education in Japan, focusing on upper secondary school.* Tsukuba, Institute of Agricultural Engineering, University of Tsukuba, 1979. 12 p.

The author discusses the system, present status and policy of vocational education. In the upper secondary schools, general courses and courses devoted chiefly to vocational education are offered. During the past years it has been observed that the number of secondary students taking vocational courses has been decreasing, and the number going on to universities has been increasing. With progress in technical innovations and modernization of industrial concerns, demands are being phased on vocational education. This paper includes the *Measures for improvement of vocational education in upper secondary schools*, recommended by a Committee set up by the Ministry of Education to attract and direct students to vocational education courses.

Okamura, Minoru. "Study on educational farm from a viewpoint of recurrent education", *Bulletin of Tokyo Gakugei University; Series VI. Technology and Home Economics* 9:20-28, November 1977. (In Japanese with English abstract)

The study outlines the history of the educational farm in Japan from 1869 to 1977, and points out that educational farms offer rich learning experiences to all from early childhood to post-school stages. In addition to an agricultural harvest, one can reap educational, cultural, recreational and human rehabilitation benefits from the "educational farm" programme.

*Sakihama, Shuei. *Technician education in Japan.* [d377.5(520)/Sak]

Section I of this paper outlines the importance and present situation of technical education in Japan. Section II deals with points to be considered in technician education planning, while Section III discusses the steps in curriculum construction and gives three examples of technician education curriculum.

*Yoshio, Jiro. *Outline of technical education and curriculum in Japan.* [d377.5:371.214(520)/Yos]

The writer discusses the educational structure, the structure of technical education and the construction of the technical education curriculum in Japan.

MALAYSIA

Malaysia. Ministry of Education. Technical and Vocational Division. *Malaysia: combining education and work.* [*country study*] prepared by V. Murugasu. Bangkok, Unesco, 1978. 50 p. (*Unesco. Combining education and work: experiences in Asia and Oceania*)

Contents: General description and policy trends; Programmes for combining education and work experience within the formal system of education; Non-formal education programmes designed for development of productive skills; Project report: The pre-vocational education programme: The vocational schools programme.

______. ______. ______. "The vocational schools programme in Malaysia," *APEID Inventory of Educational Innovations in Asia and Oceania.* EIA no. 98, December 1979. 4 p.

______. ______. ______. "Combining education and work, a Malaysian success story," *Unesco News,* Press release no. 1, January 1980. 2 p. (abstract of above)

Describes an innovative programme to impart vocational skills to high-school students to cater to the skilled manpower needs of Malaysia and to reduce the number of unemployed school-leavers.

NEPAL

Asian Regional Expert Meeting on Vocational Training, Sydney, 2-20 December 1968. *Questions and summary of replies to questions,* Geneva, ILO 1968. 1 v. (various paging) (ILO/ARVTP/Sydney/II, 1-10)

Mananthar, T.B. "The school level vocational education in Nepal," in Nepal. National Education Committee. *Education and development,* ed. by Mohammad Mohshin and Prem Kesaju. Kathmandu, National Education Committee, 1975. p. 29-52

The educational policies formulated in the National Education System Plan of Nepal stress the need for skill development at all levels and the integration of vocational education with general secondary education. As a compulsory element of the general secondary-school curriculum, vocational subjects will take up 20 per cent of time, half of which will be devoted to work experience. The same amount of time has been prescribed for the vocational school curriculum where the subjects will be studied in more detail. Vocational subjects must correspond to economic needs and manpower requirements, with special emphasis on agricultural education. The construction of workshops at schools and the acquisition of the necessary equipment represent an important cost factor. Successful completion of both general and vocational schools give access to any higher education institution.

Nepal. /Ministry of Education/ National Education Committee. Centre for Education Development, Maharajgung, Kathmandu. *Nepal: Combining education and work.* /*country study*/ Bangkok, Unesco, 1978. 22 p. (*Unesco. Combining education and work: experiences in Asia and Oceania*)

Contents: General description and policy trends; Reorienting school programmes to combine education and productive work experiences; Combining education and work for out-of-school population; Project report: Education for rural transformation; New approaches to adult education programme; Badikhel drinking water project.

*Patil, P.B. *National development and education and training of technicians.* /d377.5/Pat/

The development of human resources and the contribution and preparation of technicians are examined. The National Education System Plan for 1971-76 for Nepal is outlined and its implications for technician education planning discussed.

Pradhan, G.S. "Vocational secondary education in Nepal," in Nepal. Centre for Educational Research, Innovation and Development. *Education and development; trends and issues,* ed. by Prem Kesaju and Gaja Sundar Pradhan, Kathmandu, CERID, 1979. p. 83-92.

A summary of the evaluative study report on the effectiveness of the National Education System Plan (NESP), which set up separate vocational secondary schools offering vocational subjects for 30 to 40 per cent of the school hours as opposed to 20 per cent in the general secondary schools. Accordingly, 116 vocational secondary schools have been so far established all over Nepal and are giving vocational training to a large number of students. The study recommends improvements in the courses of study, textbooks, workshop facilities and teacher preparation, and the setting-up of a high-level council to determine policies and evaluate vocational education programmes.

Thapa, Rana Bahdur. "Vocational education in Nepal," in Nepal. Centre for Educational Research, Innovation and Development. *Education and development,* ed. by Thakur M. Sakya and Prem Kesaju. Kathmandu, CERID, 1977. p. 69-80.

The development of vocational education is traced to some 40 years back. The content of various programmes, the problems faced and ideas for improvement of vocational education are described.

NEW ZEALAND

Drake, Claire. "Educational research for the work force and for women," *New Zealand Journal of Educational Studies* 14:94-96, Supplement 1979.

Some areas for research which have been identified by the Vocational Training Council are development of evaluation techniques research for use in training programmes; adult learning differences; follow-up study of people in training schemes; bridging the gap between formal work and education; training techniques and methods; women: the socialization process, equality of educational opportunity, preparation for work, language and employment, progressive policies in industry and commerce.

New Zealand. National Commission for Unesco. Ad-hoc Committee. *New Zealand: combining education and work* /*country study*/ Bangkok, Unesco, 1978. 53 p. (*Unesco. Combining education and work: experiences in Asia and Oceania*)

Contents: General description and policy trends; Formal programmes; Non-formal systems; Project report: Job creation programmes of government; Work exploration guidelines for schools; Labour co-operatives and their training scheme.

Renwick, W.L. "Between models of technical education," *Education* 26(2): 3-9, 1977.

Text of an address to the 1976 annual conference of the Technical Institutes Association of New Zealand describing two models for providing technical education. Model One is a description of existing technical education programmes and Model Two is what technical education will be in the next decade as influenced by changes in policies.

Scott, J.V. "The problem of young unemployed - the involvement of technical education," *Continuing Education* 11(1):8-11, May 1979.

*Titchener, A.L. *Procedures for determining equipment needs of technical institutes in New Zealand.* [d377.16(931)/Tit]

This paper outlines procedures that have been used to determine the equipment needs of the technical institutes.

PAKISTAN

Asian Regional Expert Meeting on Vocational Training, Sydney, 2-20 December 1968. *Questions andsummary of replies to questions* [Geneva, ILO, 1968] 1 v. (various paging) (ILO/ARVTP/Sydney/II, 1-10)

Country Workshop, Islamabad, 2-12 February 1976, sponsored by the Government of Pakistan and the Colombo Plan Bureau. *New directions in vocational guidance; report.* Colombo, 1976. 190 p.

Aware that national development programmes require technical and skilled manpower at all levels, and that the present shortage of trained personnel is due to the lack of well-planned vocational guidance programmes, the participants of the Workshop prepared recommendations to the Government of Pakistan for a vocational guidance system which would be geared to the needs of the country, at the same time taking into consideration the inevitable constraints on resources and personnel available in a developing economy.

The workshop programme concentrated on five important areas: organizing a guidance programme; problems and placement; techniques of conducting occupational surveys; research and statistics; and the role of testing.

Kalim, M. Siddiq. "Technical education," in *Pakistan, an educational spectrum.* Lahore, Arslan Publications, 1978. p. 145-154.

The article describes technical education projects and programmes being carried out under the present Education Policy, and deliberates on what still needs to be done to make technical education useful to an individual and to the country.

National Seminar on Technical and Technological Subjects, 26 July to 21 August 1976 at the Government Technical High School, Jacob Lines, Karachi. *Report.* Islamabad, Curriculum Wing, Ministry of Education, 1976. 24 p.

This seminar was organized by the Ministry of Education in collaboration with the British Council as part of an overall strategy to produce specialist teachers for the implementation of agro-technical education in the country. General, administrative and academic problems were identified and new trends in teaching industrial subjects were introduced.

Pakistan. Ministry of Education. Bureau of Education Management. *Pakistan: combining education and work [country study]* Bangkok, Unesco, 1978. 34 p. (*Unesco. Combining education and work: experiences in Asia and Oceania*)

Contents: General description and policy trends; Work-oriented education in and outside the formal system; Agro-technical education project; Polytechnic education and training; List of vocational subjects.

_____. _____. National Bureau of Curriculum and Textbooks. *Teacher training curriculum for agro-technical education: industrial arts, agriculture, home economics.* Islamabad, 1978. 61 p.

_____. _____. _____. *Teacher training curriculum for vocational subjects in classes IX and X: industrial arts, home economics, agriculture, commercial.* Islamabad, 1978. 71 p.

Under the present Education Policy (1972-80), new curricula for grades I-X were developed to make education purposeful and related to the socio-economic needs of the country. As one result of the different subject matter introduced in these curricula, a 'project-approach' technique was recommended for teaching new agro-technical subjects for grades VI-VIII. The project-approach method requires teachers to assist students in the selection of useful projects that are suitable for the respective local environments. This approach also requires a new type of teacher, called 'specialist teacher' of agro-technical education, who should be trained to supplement agricultural practice with the relevant theory, and guide the pupils in a scientific analysis of the selected projects. The training of specialist teachers should lead to spreading an attitude of love of work and hence good working habits. It is intended also to meet the objective of associating general education with socio-economic development in order to contribute to the welfare of the community.

_____. Ministry of Education and Provincial Co-ordination. National Bureau of Curriculum and Textbooks. *Vocational subjects (industrial group) electrical trades group curricula for classes IX-X.* Islamabad, 1976. X, 35 p.

Study Conference of Principals of Government Colleges of Technology and Polytechnic Institutes, Rawalpindi, 4-7 August 1979. *New management perspectives for technical institutes in Pakistan, proceedings.* Lahore, Directorate of Technical Education, Punjab, 1979. 112 p.

The Conference considered ways to improve overall management of colleges of technology and polytechnic institutes. Its specific objectives were to determine the directions of change in institutional management practices, to prepare outline plans of action in the areas needing attention, and to develop among participants analytical skills for defining and solving management problems.

A formal evaluation questionnaire was circulated at the end of the conference and the participants' responses were analysed statistically.

PAPUA NEW GUINEA

Moina, Pius. "Agriculture education in community schools, community schools aims and their implementation,"*Education Gazette* 14(2):40-42, March 1980.

Paragraphs from the forward and introduction of the Community School Syllabuses are quoted and commented on as to the feasibility of implementing the aims of agricultural education.

/Papua New Guinea. Ministry of Education, Science and Culture/ *Vocational centres manual.* Port Moresby /1974?/ 61 p.

The aims of the vocational centres are to provide practical courses designed to suit the needs of the locality, to develop desirable attributes of citizenship, and to assist in the placement of trainees, making use of their practical skills in their own locality where possible. The vocational centres also assist the Ministry of Education and other organizations in community development programmes, and take a lead in maintaining and developing the locality's culture.

This manual describes the centres' functions, policies, programme of work and course outlines.

PHILIPPINES

Abrugar, Jesus D. "Let us teach fishery arts in the elementary schools," *The Modern Teacher* XXVII(5):233-235, October 1979.

The author claims that since more than 60 per cent of the towns in the country are coastal communities and about ten million people directly or indirectly depend on the fishing industry for their livelihood, fishery education should be introduced early in schools. He lists activities for fish culture, fish capture and fish preservation which could be taught in the primary school.

Anthony, Roy Pawl. *Consideration of a polytechnic system of further education applicable to the Republic of the Philippines.* /Manila, EDPITAF, 1980?/ 2 v. mimeo.

Part I reviews the present system of education in terms of the development needs of the country. A polytechnic structure based on effective utilization of existing resources which at the same time would contribute more widely to national development is presented. Part II provides a definition of a polytechnic system for the Philippines which is also examined for its implication.

______. *A system of continuous assessment designed for evaluation and control of student progress in the technician training programme of the Philippines.* /Manila/ EDPITAF /1979?/ 23, 11, 6 p.

The 'Minimum Defectives' concept of the National Technician Training Programme is explained, and the resulting need for a continuous assessment system is identified, with design parameters stated together with decisions taken in the formulation process. Illustrated evidence of the practicability and effectiveness of the system in two years of operation is provided.

The publication incorporates a paper by Rogelio Rodrigo Altamera on *Continuous assessment as applied in the Visayas Technician Institute.*

*Belen, Hermogenes F. "Administration of technician training programmes at the national, provincial and institutional levels." in Colombo Plan Colloquium on Intra-Regional Technician Training, 4th, Manila, 1971. *Report.* p. 45-53. /d377.1/Bel/

The paper attempts to highlight some practices in the administration of technician education and problems attendant to them. Problems on national administration policy, the financing of training programmes, curriculum, and teachers of technicians are included.

Country Workshop, Marikina, Rizal, Philippines, 4-15 February 1974, sponsored jointly by the Government of the Philippines and the Colombo Plan Bureau. *New directions in vocational guidance; report.* Colombo, 1974. 174 p.

The Workshop was held following the recommendations made by the Colombo Plan Bureau Consultative Committee in 1972 to strengthen national seminar programmes and to enable discussions to go more deeply into specific problems and produce enduring results.

The Workshop programme concentrated on five important areas: organizing a guidance programme; problems of placement; technique of conducting occupational surveys; research and statistics; and the role of testing. Its basic purpose was to broaden the knowledge and supplement the work experience of key personnel so that they might fulfil their role more effectively in assisting students in the choice of courses and/or occupations.

Fadrilan, Rinzi F. "A closer look at non-formal vocational training," *The Modern Teacher* XXVI(6):287-288, November 1978.

A review of a study entitled *Non-formal education for development*, by Bernardo Ople of the National Manpower and Youth Council (NMYC), this article presents the experiences of some 200 young school-leavers aged from 16-20 who had the opportunity to attend NMYC non-formal vocational training programmes. Various types of tests were administered to evaluate the trainees' individual performances. Findings of the study with implications for non-formal education indicate that a high level of formal schooling need not be a prerequisite to vocational training. Elementary education or a minimum of functional literacy is enough preparation for one who wishes to undergo skills training. However, it was found that trainees with a higher level of formal education have better chances of gaining much from vocational training.

Formal and non-formal education are defined, and the importance of providing non-formal education is explained.

Fronda, Cesar B. "A lesson plan in elementary agriculture arts," *The Modern Teacher* XXVII(9):484, February 1980.

Outlined in the lesson plan are the cognitive and affective objectives, strategies and activities, and references to enrich the lessons.

Galon, Manuel Ta. "Work education is unnecessary?" *The Modern Teacher* XXVII(2):67, 73, July 1979.

The author explains that work education in public elementary schools is elementary agriculture, industrial arts and home economics; and is 'what a man puts into his brain-knowledge, and hands-skills.' In refuting a criticism that the present elementary curriculum is clogged with unnecessary subjects, like work education, the author describes the aims of work education and claims that if carried out properly according to its objectives, the present problems of society like food shortage, juvenile delinquency, unemployment and under-employment would be eased.

Ganapin, Jose G. "An achievement test in work education, grade six under the exchange class programme," *The Modern Teacher* XXVI(2):92-93, July 1978.

"Harnessing education to development in the Philippines," *Unesco News*, Press release no. 2, January 1980. 2 p.

/"Harnessing education to development in the Philippines,"/ *Inventory of educational innovations in Asia and Oceania* EIA nos. 99-102, 1979 Dispatch.

A report of the following four experiments combining education and productive work: Boat Building Programme of Zamboanga School of Arts and Trade (ZSAT); In-Plant Schools Upgrading Programme; The Kabataang Barangay National Manpower and Youth Council Youth Development and Skills Training Programme; and the Alternative Technology concept: commitment of the Technological University of the Philippines to the community.

*Junia, Reginaldo L. *Development of technician education in the Philippines.* /d377.5(914)/Jun/

This paper describes how the Philippines arrived at a national curriculum for technician education, standard setting and industrial linkages, and staff development.

*______. *Perspectives and prospects for the development of industrial manpower in the Philippines (The Technician Education Development Programme).* /d331.86(914)/Jun/

Presents what is being done in the Philippines for the development and management of the technician education system.

Orais, Felipe Sug. "Is elementary agriculture a forgotten subject," *The Modern Teacher* XXVII(9):483-485, February 1980.

The article explains that the teaching of agriculture in the lower grades introduces children to the rudiments of plant life and growth, instils habits of industry and thrift, and helps in the nationwide campaign for food production. In addition to a list of typical teaching units covered in agricultural education, the author mentions ten discouraging factors which teachers must find ways to cope with in order to make the course meaningful and useful.

Philippine Normal College. *An assessment of the curricula and delivery capabilities of public vocational agricultural and fishery schools in the Philippines.* Manila, The Philippine Council for Agriculture and Resources Research (PCARR), 1978-

The purpose of the study is to secure responses from a sample of students, alumni, faculty members and administrators. Analysis of the data is to be used by the Department of Education and Culture as basis for determining how the curricula of agriculture and fishery schools can be restructured to meet the country's manpower needs.

Philippines. /Ministry/ of Education and Culture. "/MEC/ Order No. 6, s. 1978: Creating a technical panel for technician education and defining its functions and responsibilities," *The Modern Teacher* XXVII (2):96-97, July 1978.

In consonance with the declared national policy to enhance the socio-economic development of the country through optimum support to training and development of lower, middle and upper-level manpower as required by the economy, a Technical Panel for Technician Education to operate and serve as staff or a consultative body to the Bureau of Higher Education was created. The Order describes in detail the functions of the Panel.

______. "MEC Order No. 48, s. 1979:Accrediting vocational training and industrial work experience," *The Modern Teacher* XXVII(6):319, November 1979.

Directives are given on how to credit industrial work experience in a specific vocation for one year, or vocational training completed outside the formal school system, to a student in an allied course in school.

Philippines. [Ministry] of Education and Culture. Educational Development Projects Implementing Task Force (EDPITAF) *Agricultural education.* Manila, 1977. 13 p. (Primer: Educational Development Projects IP 005-A 4-77)

Explains how agricultural education is being upgraded through agricultural and rural development projects implemented by the Ministry of Education through EDPITAF.

______. ______. ______. *Vocational/technical education.* Manila, 1977. 15 p. (Primer: Educational Development Projects IP 004-A 4-77)

The study of the Presidential Commission to Survey Philippine Education (PCSPE) conducted in 1970 revealed that training institutions had not provided the vocational and technical skills required by the country, and had not been given due attention and adequate support in terms of equipment, facilities and trained teaching staff. As a follow-up of these findings, the Education Task Force conducted feasibility studies on the establishment of ten regional manpower training centres and three technician institutes. The programmes offered and their administration are described.

______. Unesco National Commission. Department of Foreign Affairs. *Philippines: combining education and work [country study]* Bangkok, Unesco, 1978. 30 p. (*Unesco. Combining education and work; experiences in Asia and Oceania*)

Contents: General description and policy trends; Reorienting school programmes to combine education and productive work experiences; Combining education and work for out-of-school population; Project report: The supervised farming programme.

*Vergara, Jose R. *New directions for technician education in the Philippines.* [d377.5(914)/Ver]

The paper traces the development of technician education in the Philippines and gives an outline of the recently-established National Polytechnic System.

*______. *Technician education curriculum and the evaluation of learners performance. p. 4* [d377.121.4:377.126/Ver]

REPUBLIC OF KOREA

Busan Mechanical Technical School. Haeundae [1978?] 19 p.

The history, aims, entrance requirements, courses and facilities of the school are described. Illustrated with photographs, diagrams and tables.

Kim, Yoon Tai. "Effectiveness of different modes of vocational training in Korea," *The Journal of Korean Education* 3(1):12-17, June 1976.

The increased proficiency of the labour force is seen as expedient to further economic growth of the country. To provide directions to future training programmes in improving workers' skills, this study was carried out to identify the effectiveness of different forms of training. The survey shows that training institutions have problems in improving the quality of teachers and the content of the curriculum as well as in obtaining appropriate training equipment. Two types of training programmes are proposed; a school may choose the programme suited to the needs of its students.

Follow-up Seminar of the First Unesco Mobile Agricultural Teacher Training Course /Seoul/ 8-12 August 1977. *Report on the follow-up Seminar held at and conducted by the Secondary Teacher Education Institute, College of Agriculture, Seoul National University, under the joint auspices of the Ministry of Education and Unesco.* Seoul, /1977/ 134 p.

This seminar was held to find out to what extent the recommendations made in the First Mobile Seminar, August 1974, had been implemented. For recommendations not carried out, the seminar identified problems which hindered implementation and sought practical suggestions for improvement. The main problems centred on teachers - poor qualifications, inadequate training, shortage and low morale. Some suggestions for improvement included holding mobile training courses every second year, holding conventions to promote agricultural education and report on agricultural researches, making in-service education practice-oriented, giving tax exemptions to students taking up agriculture to attract them to the field, and providing research allowances and opportunities for study visits.

Khoi, Lê Thanh. "Republic of Korea /case study/" in *A study on the general educational requirements for access to vocational education.* Paris, Literacy, Adult Education and Rural Development Division, Unesco, 1979. p. 20-25 (*Unesco. Surveys and studies in adult education*)

The study covers problems, status of occupational training, national skill certification system, and a suggested direction of vocational education and training.

Korea, Republic of. Ministry of Education. National Institute of Education. "Industrial education," in *Education in Korea, 1979-1980.* Seoul, 1980. p. 54-64, 72-83.

An outline of industrial education in the country shows that up to 1960 the economy was largely agrarian; after 1962 the implementation of a series of five-year plans ushered in an era of rapid economic growth in which capital-intensive heavy and chemical industries became important and generated a demand for trained manpower.

Institutional improvement of industrial education entrusts the training of technical manpower to high schools, vocational colleges and universities. The previous five-year higher technical schools have two-year special colleges which turn out middle-grade engineering personnel. The technical high schools fall under four types, while agricultural education aims to increase the number of owner-farmers by providing special farmer-owner courses, scholarships and government financial subsidies to facilitate settlement in farming communities. Education in fisheries and other maritime subjects are also being offered in high schools and colleges. In the development of vocational training, expanded educational opportunities are being made available to industrial workers, and industrial establishments are encouraged to establish school facilities right on the factory sites.

Korean Educational Development Institute, Seoul. *Basic study for the improvement of agricultural high school curriculum.* Seoul, December 1979. 156 p. (*KEDI. Research report no. 85*). In Korean.

______. *Development of individually-assessed skill learning model and related instructional materials for the improvement of industrial arts programme in the middle schools.* (Abstract). Seoul, 1973. 9 p. mimeo.

______. *Vocational technical education in the Republic of Korea,* by Se-Ho Shin, Jeoung-Keun Lee and Sa-Myung Hong. Seoul, 1979. 61 p.

After the devastating war, the country had to quickly rebuild itself, and lacking natural resources, put full force in the development of its human capital resource. The education system was looked to for the maximum development of its people and, among other aspects, the development of their productive skills. Vocational and technical education from primary to college level and non-formal programmes are described in the light of their roles to further the Economic Development Phase, in order to make the country not only self-sufficient but in the forefront of the developing countries.

Lee, Jeoung-Keun; Mee Rha Hahn and Sa-myung Nong. *Current status of vocational education and training in the Republic of Korea.* Paris, Literacy, Adult Education and Rural Development Division, Unesco, 1980. 31 p. (*Unesco. Surveys and studies in adult education.*)

In an analysis of the total number of employees by educational attainment, it was noticed that primary school graduates and below that level account for 53.4 per cent. The authors are concerned that there is no systematic, sustained effort to train them although they constitute a valuable human resource if trained for productive work. Existing occupational training is described and suggestions are given for the direction of vocational education and training.

SINGAPORE

Colombo Plan Staff College, Singapore. *In perspective, Colombo Plan Staff College for Technician Education, first two years.* Singapore /1978/ 37 p.

A report of the College, which was established in April 1974 as a joint and co-operative enterprise of 27 member countries of the Colombo Plan, and became operational in 1975. The basic structures, content and methodologies which have been established and the activities which have enabled the College to reach out to 21 countries in the region and build up a constituency of some 400 key persons responsible for improvement in the education of technicians in their respective countries are described.

*Khoo, Vincent Kah Tat. *Technician and apprenticeship training - the Jurong Shipyard Ltd. experience.* /d377.35(595.13)/Kho/

The writer discusses his experience in the areas of technician and apprenticeship training under three broad aspects: (1) craft training and the apprenticeship training scheme at Jurong Shipyard Ltd.; (2) other forms of technical training at the shipyard; and (3) the need for co-operation between industry and technical institutions and what has been done at the shipyard.

*Lim, Ho Hup. "Manpower development and technical education," in Colombo Plan Colloquium on Intra-Regional Technician Training, 3rd, Singapore, 1969. *Report.* p. 64-70 /d331.024:377/Lim/

The writer elaborates on two points of manpower planning - namely, having a limited target, and the setting-up of more flexible types of institutions, and puts forward the idea of the "teaching factory."

*Mohan, S. *Developing a technician through apprenticeship/in-service training.* /d377.5/Moh/

Discusses training schemes for technicians in the Port of Singapore Authority, their career prospects and promotions, cost of training and vacation training for institutional students.

*Ong, Wee Hock. *Harmonization of technician education and training with actual manpower needs in Singapore.* [d377.5.331.024/Ong]

Section I of the paper deals with planning at a national level. This concerns formulation of policies, objectives, decisions on allocation of resources for the building of institutes and training centres. Section II deals with problems met in implementing the programmes and projects and a description of the various schemes in operation.

Singapore. Ministry of Education. *Singapore: combining education and work [country study]*, prepared by Cheong Heng Yuen. Bangkok, Unesco, 1978. 30 p. (*Unesco. Combining education and work: experiences in Asia and Oceania*)

Contents: General description and policy trends; Reorienting school programmes to combine education and productive work experiences; Combining education and work for out-of-school population; Project report: Joint Government - Industry Training Scheme: HDB/PWD/ITB Joint Construction Trades Training Scheme; Common secondary 1 and 2 curriculum; Secondary 3 and 4 curriculum; Trainee population by trade and centre, September 1977; Enrolment in HDB/PWD/ITB Joint Building Construction Trades Training Scheme.

______. Vocational and Industrial Training Board. *Annual reports*, 1975-76 to date.

______. ______. *Prospectus*, 1976-77 to date.

______. ______. "Vocational training and continuing education - a single process of preparation for work," *APEID Inventory of Educational Innovations in Asia and Oceania* EIA 106, December 1979.

The Industrial Training Board Act 1972 (No. 36 of 1972) was enacted by Parliament on 22 November 1972 and brought into operation on 1 April 1973. The Board is an agency of the Ministry of Education concerned with producing skilled workers at the craft or trade and technician levels to support Singapore's planned economic growth. At the same time the Board is concerned with the further development and skills training of school leavers.

The above two publications provide current information on the Board and on the industrial training system including other related activities.

______. Vocational and Industrial Training Board. "Construction Trades Training Scheme: operated by the Vocational and Industrial Training Board jointly with the Housing and Development Board and Singapore Contractors Association Limited," *APEID Inventory of Educational Innovations in Asia and Oceania* EIA 105, December 1979. 6 p.

Describes the background, implementation, outcomes, evaluation and innovative features of a scheme which helps to provide an opportunity for youths with limited educational attainments to be channelled into a useful activity where they can learn a skill to make their living. The scheme provides full-time on-the-job training at real work sites, combined with theoretical instruction and extension-education classes covering six hours per week.

SOCIALIST REPUBLIC OF VIET NAM

Chu An. "Capacity for the organization of productive labour for pupils in the senior schools in the South," *Pedagogical Studies* (Ministry of Education, Hanoi) 10th year 9(76):18-19, 1978. In Vietnamese.

The article discusses the results of an inquiry into the capacity to organize productive labour for 1,000 teachers and pupils of 20 schools in seven provinces in the south of Viet Nam. Teachers and pupils learn about industrial and agricultural careers. Schools have local resources and facilities (multiform material basis) and are helped and given attention by the State, the local government, the pupils' parents and the people. The author concludes that schools should not hesitate to organize experiences involving productive labour for the pupils. At the same time there should be adequate policies for training teachers. (Bùi Thi Xuân)

Chu An. "Quang Trung School experience in building material and technical basis for productive labour," *Pedagogical Studies* (Ministry of Education, Hanoi) 11th year 5(84):21-24, 1979. In Vietnamese.

The author describes some of the experiences of Quang Trung School in Nghia Binh province in building material and technical basis for productive labour. The purposes for providing these experiences are: (1) to establish a 'right' ideology in productive labour and consider it an indispensable activity in the school; (2) to build actively and self-reliantly a material and technical basis for serving the activities of productive labour; (3) to develop the capacities of teachers, especially the technical and labour management capacities. (Bùi Thi Xuân)

Nguyen Hong Hai. "Initial experience in making pupils work in an organized way at a factory," *Pedagogical Studies* (Ministry of Education, Hanoi) 10th year 7(74):16-18, 1978. In Vietnamese.

The article describes experiences in organizing work for senior secondary students in a factory. The eighth-and ninth-form students are taken to factories to work so as to foster the labour habit. The tenth-form pupils are oriented in learning such work as chopping, planing, turning, carpentry, hammering and running engines.

The outcome is educationally and economically favourable. This work experience helps factory managers to understand training methods and educational principles, and helps teachers to adapt their curriculum and syllabus to the manpower skills needed by the factory. The learning experiences in the factory appear to develop favourable attitudes towards work and knowledge about work. (Bùi Thi Xuân)

Nguyen Le Hoa and Doan Quang Thiet. "New development of Bac Ly School in organizing productive labour for pupils," *Pedagogical Studies* (Ministry of Education, Hanoi) 10th year 9(76):7-10, 1978. In Vietnamese.

According to the author, many measures are being taken in the Bac Ly School to organize appropriately productive labour consistent with the pupils' age level and combine it closely with other educational activities. These are: (1) to select the contents of productive labour consistent with the pupils' development level, with the course of cultural and technical study and with the productive directions in the locality; (2) to organize labour rationally consistent with the organization of socialist large production and with consideration of the pupils' health; (3) to improve the organization of working days; (4) to guide the activities of productive labour done by the pupils' families and by the agricultural co-operatives. (Bùi Thi Xuân)

Nguyen Trong Ba. "To combine the teaching of maths with labour of pupils," *Pedagogical Studies* (Ministry of Education, Hanoi) 10th year 11(78):14-15, 1978. In Vietnamese.

The author presents teaching experience of 'combining study with practice' through combining the teaching of mathematics with productive labour. He introduces the following experiences: (1) guiding the pupils to use knowledge of mathematics so as to measure the attained results after labour; (2) introducing the attained results into labour and into the contents of lessons and exercises; (3) applying what has been learned theoretically and practically in order to evaluate the results of labour of the pupils individually and collectively. (Bùi Thi Xuân)

Nguyen Van Ho. "Guiding pupils in the rational organization of productive labour," *Pedagogical Studies* (Ministry of Education, Hanoi) 11th year 3(82):14-16, 1979. In Vietnamese.

To organize the school pupils in productive labour is a difficult problem and requires obtaining multi-facet results both educationally and economically. The author experimentally guides his pupils in the national organization of productive labour through production of waste bricks. He introduces the details of this process in the three following steps: (1) to provide the pupils with some productive techniques; (2) to guide them to make a working plan and build a new productive process; (3) to outline the labour task clearly so that the pupils can carry out the task independently from the beginning to the end. The author emphasizes that the above-mentioned steps aim at creating the pupils' thinking before doing manual labour and stimulating their love of labour with science and technique. (Bùi Thi Xuân)

Pham Chanh Truc. "Some initial experience in guiding the (teach well and learn well) emulation in Ho Chi Minh City," *Pedagogical Studies* (Ministry of Education, Hanoi) 10th year 9(76):3-6, 1978. In Vietnamese.

The 'teach well, learn well' emulation movement in Ho Chi Minh City is new but has many valuable experiences. The author stresses the following experiences: (1) heeding the political task of the whole educational branch to guide the emulation movement; (2) considering a training method in combining education with productive labour; (3) launching stimultaneously the emulation movement from 'point' to 'face'. The author also points out the defects of the emulation movement which does not bring into play the teachers' collective role in correctly combining education with productive labour, and providing steady guidance to the emulation movement from top to bottom. (Bùi Thi Xuân)

République socialiste du Viet Nam. Commission nationale pour l'Unesco. *Combiner l'éducation et le travail; République socialiste du Viet Nam /étude nationale/* préparée par Nguyen Khac Vien. Bangkok, Bureau régional de l'Unesco pour l'education en Asie et en Océanie, 1978. vi, 26 p. (*Unesco. Combiner l'éducation et le travail. Expériences en Asie et en Océanie*) In French.

Contents: Part-time study part-time work school; Objectives; Hoa-Binh school; Other experiences; General policy; Conclusion.

SRI LANKA

Fernando, T.O.P. "Pre-vocational education in Sri Lanka," *Spectrum* VII (11):102-107, February 1975.

A description of the pre-vocational education programme in the junior secondary education curriculum.

*______. "Technician education and training component in a national plan for technical education and training," in Colombo Plan Colloquium on Intra-Regional Technician Training, 4th, Manila, 1971. *Report.* p. 16-25. (d377.014.542/Fer)

This paper first reviews the present knowledge of technician education in relation to the current national development effort. It then discusses the data requirements and types of information flow required if technician education is to meet the future needs of the nation in an optimal way.

Sri Lanka. Ministry of Education. Curriculum Development Centre. *In-plant education; a handbook.* Colombo, 1976. 11 p.

In-plant education refers to the educational experiences that students can assimilate in a factory, farm or any other working place. This handbook provides guidelines to regional directors, education officers and other field officers on how to organize in-plant education projects in their areas.

"Technical Education Unit Programme," *APEID Inventory of Educational Innovations in Asia and Oceania* EIA no. 108, December 1979. 8 p.

/Unesco/ "Technical education as an integral part of the secondary school curriculum," and "The place of technical colleges in the system of education," in *Democratic Socialist Republic of Sri Lanka: policies for education, a review.* Paris, 1979. p. 27-33, 71-73. (Unesco. ASMS/ED/EPP/012) Distribution limited.

THAILAND

Follow-up Seminar on Agricultural Teacher Training and Evaluation Exercise, Asia Hotel, Bangkok, 26-30 November 1979. *Report.* Bangkok, /Ministry of Education, 1979?/ 262 p.

This seminar is a follow-up of the 1977 Seminar of Mobile Agriculture Instructor Teams to evaluate the use of the training techniques introduced at the earlier seminar. This 1979 seminar also presented new ideas to organize and improve agricultural education to meet requirements set forth by government policy. It was jointly conducted by the Royal Thai Government and Unesco under the sponsorship of Funds-in-Trust donated by the Government of Japan.

Sato, Kunio. *An alternative approach to vocational education in Thailand.* Bangkok, ARTEP, 1974. 111 p. mimeo. Distribution limited.

Secondary vocational schools, technical institutes, mobile trade training schools and other training programmes are discussed in the light of their relevance to employment. Guidelines for training policy are provided for the consideration of authorities concerned.

"Technical and vocational education in Thailand," *Unesco Chronicle* XXI(11): 318-320, November 1975.

A description of the phases of development, achievements, problems and prospects of the King Mongkut's Institute of Technology (KMIT) which was set up in 1961 to offer training courses in electricity, electronics, mechanics, civil engineering, architecture and production techniques.

Thailand. Ministry of Education. Adult Education Division. "Interest Groups - a type of adult vocational training technique promoting appropriate technology at the village level," *APEID Inventory of Educational Innovations in Asia and Oceania* EIA no. 109, December 1979.

______. ______. ______. (Technology in the village: Thailand sets an example) *Unesco News* Press release no. 3, January 1980. 2 p. (Rewritten version of above entry)

Thailand. Ministry of Education. Department of General Education. Planning Division. *Thailand: combining education and work [a country study]* prepared by Ruang Charoenchai. Bangkok, Unesco, 1978. 42 p. (*Unesco. Combining education and work: experiences in Asia and Oceania*)

Contents: General description and policy trends; Combining education and work in the formal school programmes; Combining education and work for out-of-school population; Project report: The mobile trade training school.

*Thanoo Swaengsakdi. *Efficient resource utilisation in technician education.* [d377.5/Tha]

The author states that technician educators, planners, and administrators should be conscious of the economics of education. He shows how high costs for training of technicians can be reasonably reduced by reducing capital costs and by maximizing the use of existing internal in-school and out-of-school resources.

*______. *Role of technician education and training in manpower development.* [d377.5.331.024/Tha]

In order to keep pace with changes and developments in the educational, political, social and economic situations, various factors should be critically analyzed in order to reach meaningful conclusions and recommendations in finding out the relationship between technician education and the optimization of resource utilization. Thus the role of technician education and training in manpower development will be apparent. In his discussion, the author refers to Thailand as an example.

"Vocational education: the state's 'middle manpower' formation," *Business Review* 5(8):507-510, September 1977.

Middle manpower describes occupations across a broad front of economic endeavour, including agriculture and natural resources, business, health and human services in addition to the industry/engineering/science field which was originally the occupational domain of the technician. The task of training is entrusted to the Vocational Education Department for lower-level and the Institute of Technology and Vocational Education of the Ministry of Education for upper-middle manpower.

This article on the present situation of vocational education in Thailand includes comments on a survey of employment of the alumni, and the establishment of the Bangkok Technical Institute which has been transferred to the jurisdiction of ITV.

Wyant, Tom. *Country course in Thailand in instructional planning, design and delivery for technician courses; teaching-learning methods.* Bangkok, 1978. 12 p. mimeo.

This course material introduces existing teaching/learning strategies, points out their advantages and disadvantages and encourages the instructor to think of new approaches. The material was used in a course conducted in Bangkok in 1978 jointly by the Ministry of Education, King Mongkut's Institute of Technology, and the Colombo Plan Staff College for Technician Education, Singapore.

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Academy of Sciences of the USSR. Institute for Research on Education for Productive Work and Polytechnical Education. *Union of Soviet Socialist Republics: combining education and work [country study]*, prepared by N.P. Semykin. Bangkok, 1978. 25 p. (*Unesco. Combining education and work: experiences in Asia and Oceania*)

Contents: General description and policy trends; Programmes to combine education and work.

"Education for work - Part I: production training and vocational guidance in Soviet schools," *Soviet Education* XIX(11):1-88, September 1977.

This is a selection of articles from Soviet periodicals which have been translated from Russian into English: Labour education - an important task of the school, production, the family, and the community; Trainworthy replacements for the work force; Ways to improve the work of pupil brigades; Inter-school production training combines; and The Twenty-fifth Congress of the Communist Party of the Soviet Union and the labour education and vocational guidance of youth.

ABOUT THE BULLETIN

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